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Ahoy!

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VIEW FROM THE BRIDGE

Ever try to type while patting yourself on the back? It's not easy! But that's the task that faced us while assembling this issue of *Ahoy!* Page after page, we couldn't help pausing to reflect on how far we've progressed in only four months. . . from just another entry in the Commodore magazine market to the best-looking, most readable publication of the lot!

Our formula thus far has been simple: find out what our readers want, and give it to them. You told us you were hungry for a Commodore publication that looked like a *real* magazine—that wasn't as graphically interesting as a user's manual. You told us you wanted a magazine that struck the delicate balance between uninterpretability and condescension. We feel that we've responded on both counts with resounding success.

And, more specifically—you told us you wanted an automatic proofreading program to work in conjunction with our listings. We've got it in this issue—and we know what you'll find the *Commodore 64 Bug Repellent* a joy to use. If you've never used a proofreading program before, or if you have, authors Michael Kleinert and David Barron will tell you all you need to know about it on page 39. (A VIC 20 version will follow shortly.)

Have we got more? Has a Wang got memory?

Last issue, Consulting Editor Morton Kevelson instructed 64 and VIC owners on printer interfacing in general. In *Printer Interfacing, Part II* he focuses on two popular interfaces in particular: the Cardco Card?/+G and the Tymac Connection, including the telling results of an exhaustive series of tests. (Turn to page 19.)

Also from Morton K.: it's a review! It's a tutorial! It's an indepth examination of one of the most popular word processing systems available for the Commodore 64: *Easy Script and Easy Spell.* (Turn to page 15.)

What is Petspeed, and how can it put wings on your C-64, PET, or CBM computer? Joe Rotello, author of a forthcoming book on the subject, provides an *Introduction to Petspeed.* (Turn to page 32.)

You've seen laserdisc arcade games; but how does this exciting new application of laser technology apply to the home computerist? In *Playing the Light Fantastic,* Richard Herring charts the future of the laser in the arcades, in the home. . . and on the Commodore 64! (Turn to page 41.)

Richard has also provided the second installment of *Educational Software: A Guide for Parents.* As some of you discovered to your shock last issue, learning games fit into the same category as diapers, breakfast cereals, and chewable vitamins—they are *not* all the same! Continue finding out why in this issue. (Turn to page 65.)

The new *Dallas Quest* adventure game, combining text and graphics, could be the start of a new trend in computergaming. We'll tell you the game's background, its storyline, and. . . *Who Programmed J.R.?* (Turn to page 49.)

What would be the value of a proofreading program without other programs to use it on? You'll find line total values listed after each of the programs we'll now mention, with the exception of *Apple Pie,* a VIC 20 math game by Robert Alonso that not even Richard Herring could be sour on. (Turn to page 36.)

Lunar Lander by Anthony Wood requires 64 users to lower a capsule to a crash-free landing. (Turn to page 35.)

Want to make your next party a surefire success? Lay in lots of munchies, crank up the stereo, and play *Name that Star* by Bob Lloret on your C-64. (Turn to page 45.)

And for people who thought Morton K. could do nothing but write the most informative technical articles in the field. . . surprise! He writes programs, too. And if you're a user of the VIC 1515 or 1525 printers, *Lower Case Descenders* will eliminate those unsightly above-the-baseline p's, q's, y's, g's, and j's from your hard copy. (Turn to page 53.)

Of course, the *Rupert Report* appears, with the startling revelation that your computer does not always tell it like it is. Dale shatters your youthful visions in *The Noble Lie.* (Turn to page 55.)

And Dale once again challenges our readership with his latest round of *Commodares.* Answer this issue's challenge successfully, and we'll print your name for all your fellow *Ahoy!* readers to see. Worth a little programming and a 20¢ stamp, no? (Turn to page 72.)

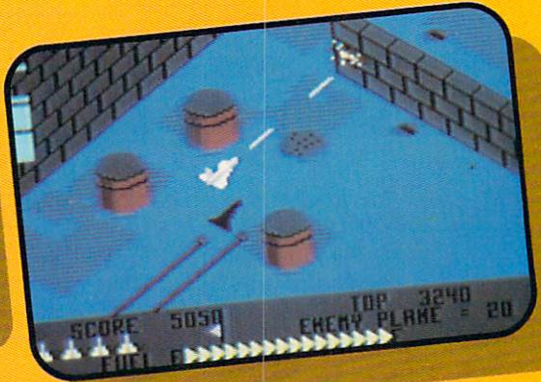
Our *Reviews* section continues to be the most macroscopic on the market. Games and utilities featured this month include *Beach-Head, Lunar Leepers, Purple Turtles,* and *Cut & Paste.* (Turn to page 57.) And in *Scuttlebutt* you'll find descriptions of the newest hardware and software available for 64 and VIC users—as well as a report on the latest round of executive comings and goings at Commodore International. (Turn to page 6.)

But we'd better cut our introduction here—it's getting hard to type again. (We're so swollen with pride, see, that our *fingers* can't hit the *keys!*) Enjoy this issue of *Ahoy!,* and write to tell us what you think!

—Steve Springer

ZAXXON FOR THE C-64!







Slamball

Maybe you've played pinball before, but not like this! Up and down scrolling over 4 full screens, plus complete ball control and even a "tilt" feature in the best computer pinball game yet.



Commodore 64 disk & cassette

Quasimodo

Quasimodo knows who stole the crown jewels. He even knows where they are, but the soldiers just won't leave him alone! This multi-screen arcade adventure is a great combination of skill and strategy.



Commodore 64 disk & cassette

ZAXXON

At last, your favorite arcade game comes home to the C-64! Amazing 3-D graphics, a diagonally scrolling screen and incredible sound effects guarantee hours of space excitement. And if you practice hard, you might be able to meet the deadly ZAXXON himself.

Commodore 64 disk & cassette



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THE NEW MARSHALL

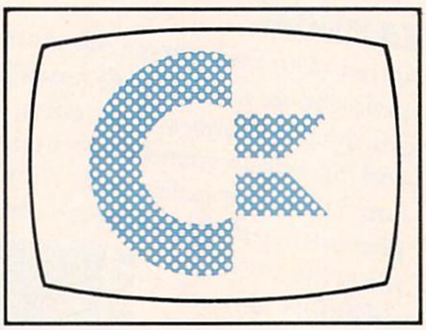
As we reported last issue, on January 13 Jack Tramiel resigned his position as president of Commodore International. Of course, there have been developments since then, not all of them corporate shuffling. Hang on.

On January 17th, Marshall F. Smith was named president and chief executive officer to succeed Tramiel. The 54-year-old Smith was president and chief exec for ten years of Thyssen-Bornemisza (formerly Indian Head Inc.), a diversified industrial company. Smith's background is in manufacturing, finance and marketing.

Tramiel himself said that the company would need a professional executive to continue its astonishing growth, to transform it from a "family" business—Tramiel's one-man show—into an organization worthy of a billion dollars a year in sales. Although Tramiel was aware that a change was necessary, and welcomed it, there was apparently some friction over the choice of Smith. That choice was made by chairman of the board Irving Gould. Smith reportedly had refused a previous offer of an executive position with Commodore, that offer made while Jack Tramiel was still calling the shots. Tramiel will stay on as a consultant and retain his shares in the company.

Then, on January 31, three developments: it was announced that Commodore's two new entries in the home computer market—the 264 and 364 models—would not be shipped in April as scheduled, but would be delayed until later in the year. At the same time, four top-ranking Commodore marketing and manufacturing executives resigned. And finally, inevitably, Commodore stock dipped a bit in the wake.

The buzz on Wall Street ran as follows: 1984 will be a critical



year for Commodore, a crucial test of whether the company can keep its momentum. To do that, strong leadership and innovative product will be necessary. But the company is not off to a great start, say Wall Street analysts. There is a sudden void in top management, and no exciting hardware product on the horizon. The 264 and 364 are not innovative enough, and the 64 will only carry the company so far. Gloom and doom. So say the analysts.

We'll pass on second-guessing the executive situation. Resignations *are* inevitable after a change at the top, but, after all, this *is* Commodore we're talking about. Order will be restored, or else. . . not.

We won't wax ecstatic about the future of the 64, except to note that 1.2 million of them were sold in 1983, with a strong Christmas sales surge. Not enough to make IBM sweat blue, true, but good enough to make a "wait and see" strategy workable.

It is obvious that Commodore is re-evaluating its strategy. The delay in shipments of the 264 and 364 models could be due, as Commodore claims, to manufacture and parts availability conflicts with the still-strong C-64; or it could be due to the lukewarm reception the units received, the charges that they are not innovative enough. We will only point out that the quantum leaps we've witnessed in technology in the past four years had to slow—to consolidate, if you will—at some point. The time is now. . .until superchips trickle down to the home market.

We found much to admire in the proposed 264: the improved cursor controls, the elegant new BASIC commands, the realization of built-in software. But here are two innovations—advice free for the asking, Commodore, and worth what you're paying—that we would like to see in the next wave.

One is improved access to peripherals, a high speed bus. The home user doesn't necessarily need faster internal communication, but faster communication between computer and peripherals, and simpler commands to effect them, would be welcome.



Release date on the Commodore 264 has been postponed.
READER SERVICE NO. 107

And while you're building in software, why not a game/quiz generator? Parents and kids could design their own educational games and quizzes without programming; gameplayers could design their own games simply and easily, and Commodore could move a lot of product.

BEAMING ABOARD

No stranger to technological advances in human engineering, Leonard (Mr. Spock) Nimoy recently joined the crew of Human Engineered Software (or Hes-Ware). He'll appear in print, TV, and radio advertising for the company.

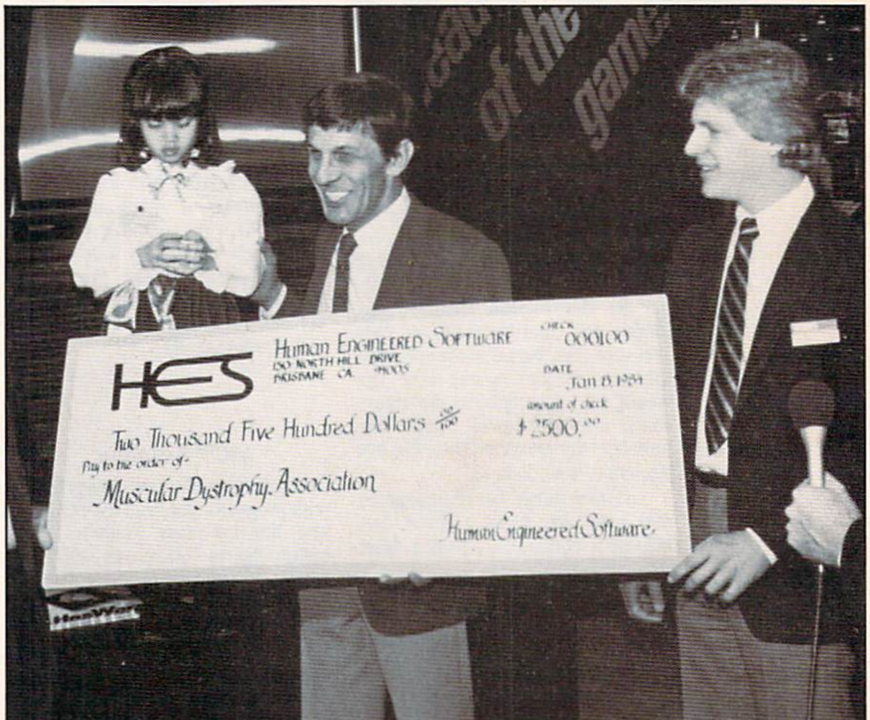
Following the announcement at the Consumer Electronics Show in January, Nimoy played *The Minnesota Fats Pool Challenge* with the billiards legend of the same name. At $100 a ball, they pocketed $2,500 of a minimum $100,000 donation HesWare has guaranteed to the Muscular Dystrophy Association based on sales of their products.

Human Engineered Software, 150 North Hill Drive, Brisbane, CA 94005.

THE SOFT UNDERBELLY OF EDUCATION

"Soft underbelly" is a phrase originally coined in WWII, denoting a strategic weakness. According to the people at American Educational Computer, "the soft underbelly of education" is lack of follow-up; most educational computer programs take the child so far, and no farther, in any one discipline. They drill, rather than teach, because they are inflexible.

American Educational Computer is attempting to address the situation with educational *series* for the 64. Their *Spelling* series, for example, for children in grades 2 through 8, guides the child through the entire development of his spelling skills. Incorporating the concept of "test-teach-test," words that the student already knows are eliminated, freeing him or her to concentrate on words that bedevil. 4,000 words are included in the series, but new words can be added. "For example," AEC president Thomas Garsh points



HesWare hired Nimoy to bring in the big money.
READER SERVICE NO. 108

out, "the spelling of a child's home town or street—particularly if it is unusual—would be uniquely worth learning."

AEC's *Easy Reader* series consists of six separate software programs: *Learning About Sounds in Reading* (phonics and fundamentals for K-3), *Learning About Words 1* (grades 1-3), *Learning About Words 2* (grades 2-4, the structure and mechanics of words) and then *Reading Comprehension Skills 1, 2* and *3,* which, in the three increments, take children from grade level one through to grade eight, from fundamentals to integration and application.

AEC's *MatchMaker* series includes *MatchMaker Grammar, Vocabulary* (both for grades 4-6), *U.S. Geography Facts, World Geography Facts,* and *Spanish Vocabulary.* All of the programs in the *MatchMaker* series work on the principle of matching words and phrases. Each program has an authoring feature, which allows the child or parent to create their own programs, quizzes, and games. Each follows a standard school curriculum rather than a game format, but when the lesson is completed with at least 70% accuracy, games are made available for play.

American Educational Computer, Inc., 2450 Embarcadero Way, Palo Alto, CA 94303.

From Human Engineered Software (HesWare to you) comes *Turtle Toyland, Jr.* for the 64. For children ages six and up, the program is something of an introduction to LOGO, operated as it is by a joystick rather than a keyboard. It is designed to introduce programming concepts and techniques.

Once the fundamentals are learned, the child can create music or sprite graphics, save them (in the Toybox) and replay them to the delight of all.

Human Engineered Software, 150 North Hill Dr., Brisbane, CA 94005.

A new and information-packed math tutorial is *Flower Power Math Fun* for the 64 from Softwave. For ages 5 to 15, the program includes addition, subtraction, multiplication, division, whole numbers, fractions, decimals, and fraction/decimal conversions. The program automatically saves and tracks the student's progress.



An information-packed math tutorial, not for flower children only.* *READER SERVICE NO. 109

Rather than subtracting from the student's score for wrong answers, the skill level is automatically decreased. The colorful graphics involved a flower/weed/sun scenario, graphics which the folks at Softwave describe as "unemotional"—colorful enough to keep the student interested but not so flashy as to distract from the learning process. $39.95.

Softwave, 156 Drakes Lane, Summerton, TN 38483.

And now a quick review of what's available for the 64 from two of the most respected and prolific educational software companies.

From Hayden Software:

Shape Up (for ages 3-6) is a shape recognition game. The child helps the Shape Man deliver the correct shapes to areas and characters on the screen. In the construction phase, the child combines shapes to create new ones.

Match Up (ages 3-6) contains three games in one, teaching the principles of "same," "related," and "different."

Monkey See Monkey Spell (ages 6 and up). Help a monkey assemble letters that will spell a pictured object. Levels of difficulty allow words of three to ten letters. Including a special nonsense word concentration game (called "*computerese*"?).

Don't Shoot That Word (ages 6 and up) encourages the child to shoot the words that don't match the picture displayed, or words that don't rhyme with a displayed image, in a fast action format. Challenges word discrimination and recognition.

MicroAddition, MicroSubtraction, and *MicroMultiplication* (ages 4 and up) each contain four levels of difficulty to encourage the child's natural progression. In addition to developing the basic mathematical skills, the programs contain quizzes and single-function calculators. Popular children's songs serve as the rewards.

Great Maine to California Race (ages 10 and up) is a simulation of a westward transcontinental race. At each state, the child must answer up to three questions about the state's industry or terrain or whatever before

his or her dragster can continue. Alternative routes should make the game replayable.

Factor Blast (ages 10 and up) teaches factoring concepts. On a grid of 25, 64, or 100 numbers, kids take turns selecting numbers for which the opponent "blasts" factors. Strategy is crucial, especially if playing against Robyte, the computer.

Hayden Software, 600 Suffolk St., Lowell, MA 01853.

And from Scholastic Wizware:

Spelldiver (ages 6 and up) is an arcade-style spelling and word recognition tutorial. Players control a diver who, while avoiding sharks and flipper-nippers, removes lettermoss to reveal hidden words, which players must



Brush up on the old keystroke.
READER SERVICE NO. 110

identify as quickly as possible. Thousands of words are stored beneath the lettermoss.

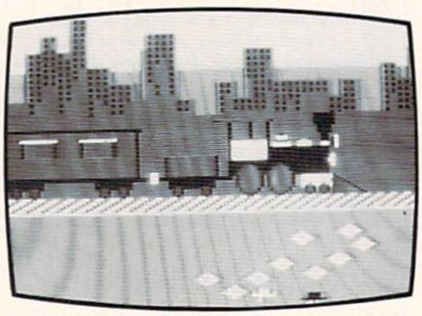
Square Pairs (ages 6 and up) develops memory, imagination and concentration powers in a grid/match format.

Bannercatch (ages 9 and up) is among Scholastic's latest offerings. It's basically *Capture the Flag,* computer-style. Kids are encouraged to develop strategies, improve their ability to visualize spatial relationships, and learn how to decipher binary numbers. A special pause feature gives them the time to develop these strategies and *schmooze* a little in the doing.

Agent USA (ages 9 and up) must scramble around the country in pursuit of the Fuzzbomb before it turns this great nation of ours into a collection of fuzzbodies. Geography, schedules, and time zones are but a few of the concepts presented.

Logo Robot (ages 9 and up) is a LOGO programming tutorial.



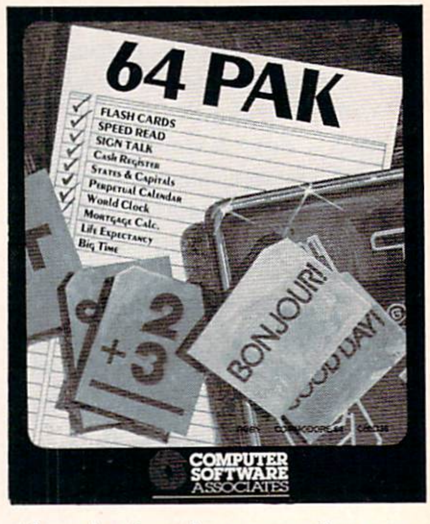


Espionage right in your own home.
READER SERVICE NO. 111

Poster (ages 9 and up) encourages the child to create colorful posters while learning programming concepts.

Turtle Tracks (ages 9 and up). Players use tracks of a turtle to create wild graphics while learning fundamental programming skills.

Scholastic, Inc., 730 Broadway New York, NY 10003.



If you're learning more than one.
READER SERVICE NO. 112

10 PROGRAMS ON TAP

64 Pak is not a whole bunch of cold ones, but an educational software package from Computer Software Associates. It turns your C-64 into a computerized classroom that teaches reading skills, geography, math, and more.

Designed with the beginner in mind, *64 Pak* offers easy-to-use, menu-driven programs. They include Flash Cards, Speed Read, Sign Talk, Life Expectancy, World Clock, States and Capitals, Mortgage Calculator, Big Time, Cash Register, and Perpetual Calendar. Cassette is priced at $19.95, disk at $24.95.

Distributed by Micro Software International Inc., The Silk Mill, 44 Oak Street, Newton Upper Falls, MA 02164.

LET MY PEOPLE GOTO

You don't have to be Jewish to read about two new programs from Isracomp: *HebrewWriter,* which replaces 27 of the C-64's graphic characters with the Hebrew character set; and *CreataScript,* which lets you create and store your own characters. Both offer a right-to-left opera-

ting system, and will work on the VIC-1525E printer.

HebrewWriter retails for $19.95, CreataScript for $29.95.

Isracomp, P.O. Box 1091, King Of Prussia, PA 19406.

DISKS OF SOFTRON

Softron Inc., not yet mentioned in these pages, offers several C-64 utility programs, two of them for the VIC-20 as well.

Better Letter & Writer — contains over 100 prewritten letters, plus invitations, resumes, applications, announcements, and the like, which you can personalize and then run on the included word processor or on another one of your choosing.

Quick Touch Typing—step-by-step lessons and multiple drills, for adults and kids.

Home Decorator—learn the theories behind funiture layout and color coordination. Then, design your own rooms by mixing and matching carpeting, wall colors, sofas, etc.

EZ/Disk—Lets you perform a variety of functions without lengthy BASIC commands. (Also for the VIC 20.)

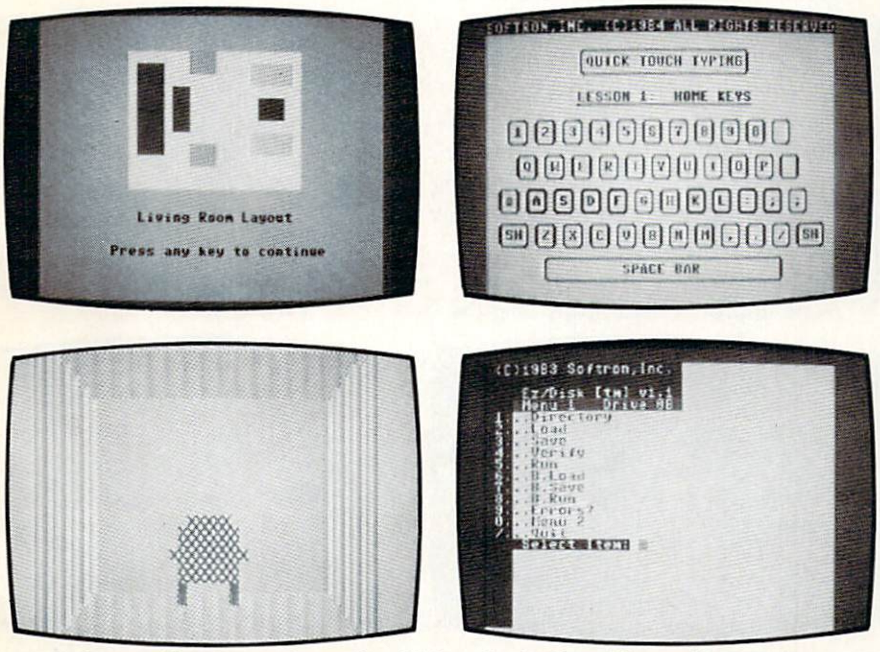
EZ Disk Plus—all that, plus disk copying, printing files directly from disk to screen or printer, appending programs, and more.

Keyboard Soft/Lay—puts BASIC commands, memory locations and maps, sprites, sound, and more at your fingertips. (Also for the VIC 20.)

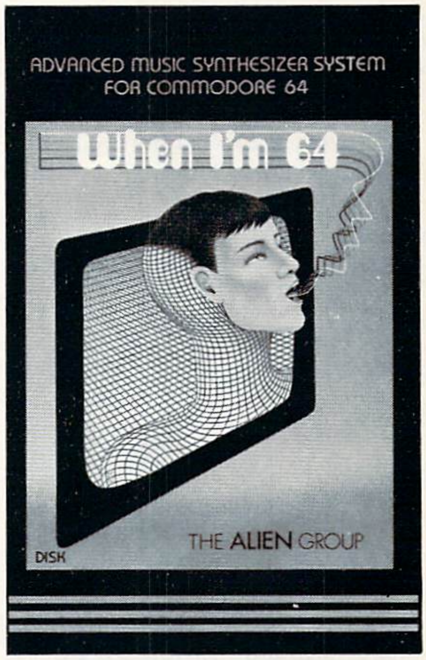
Softron, Inc., 150 Nassau Street—Suite 2024, New York, NY 10038.

ACROSS THE UNIVERSE

Designed to get the maximum use out of the 64's SID chip, *When I'm 64* from The Alien Group includes vibrato, pulse width phasing, attack-triggered filter sweep, and a metronome timing track. Notes are played on the computer keyboard, in real time or slow motion, one track at a time. Range is seven octaves. The program also displays an animated, user-redrawable face



Softron offers a variety of utilities, including **Home Decorator.**
READER SERVICE NO. 113



Popular songs in an Alien tongue.
READER SERVICE NO. 114

which mouths the words. It will sing the words if you plug in the same extraterrestrial organization's Voice Box Speech Synthesizer, reported on in these pages in February. *When I'm 64* sells for $29.95 on disk or cassette; the Voice Box is $129.00.

The Alien Group, 27 W. 23 Street, New York, NY 10010.

GAMES ROUNDUP

Hard as it is to believe that anyone could have trouble playing an Infocom game, the masters of textual adventure have announced three new means of support.

Available for all 10 games in the product line are enhancement packages, including a game map and an InvisiClues hint booklet. Price is $7.95 each. To order, call toll-free: 1(800)262-6868; in New Jersey, 1(800)238-2200.

Infocom has also established a Techno-Hotline, for questions of a technical nature only. Number is (617)576-3190.

Finally, customers who return

their game registration card will soon be receiving a consumer newsletter.

Also announced: the release of *Sorcerer,* second in Infocom's Enchanter series. This one picks up where *Enchanter* left off, with the warlock Krill defeated and the player a member of the Circle of Enchanters. Now the player must save the kindgom by locating his vanished mentor, Belboz the Necromancer, in the treacherous mists of time. The program offers a vocabulary of over 1000 words, more than any other interactive fiction product to date. Price is $49.95.

Adventure International, under license from Marvel Entertainment Group, will produce at least twelve graphic adventure games for the C-64 starring such famous superheroes as The Hulk, Dr. Strange, Spider-Man, and Captain America. The first eleven will be self-contained; the twelfth will require information accrued playing the other eleven. The schedule calls for three games to be released per year, with the first



On their way: 12 superhero games. READER SERVICE NO. 120

batch due in late spring.

Adventure International, P.O. Box 3435, Longwood, FL 32750.

Slamball is a C-64 pinball contest with four sets of flippers, tilt feature, bumpers, rollers, targets of all kinds, and complete ball control. That's from Synapse, as is the 64 adaptation of *Necromancer,* teeming with magical trees, poisonous spiders, and other strange entities.

Pro Golf by Tom Weiskopf, a joint venture of the links legend and HomeComputer Software, includes random wind, rain and pin placement, a putting green for testing green conditions, complete club selection, handicap calculation and maintenance, honors and "away" handling, and playing tips by Weiskopf for each of the 18 holes. In addition to being a strategy game, the program is a learning tool, requiring the player to select clubs and calculate direction and strength of shots. A player starts with a 15 handicap; as he improves, that drops, and the computer allows him to hit longer drives and take more chances.

HomeComputer Software, 1307 South Mary Ave.—Suite 209, Sunnyvale, CA 94087.

A quick look at the arcade-style offerings from Creative Equipment, a company neglected thus far in *Scuttlebut:*

Tyler's Dungeons requires you to navigate a 255-room, three-dimensional maze, avoiding the monster LURK and seeking hidden treasure.

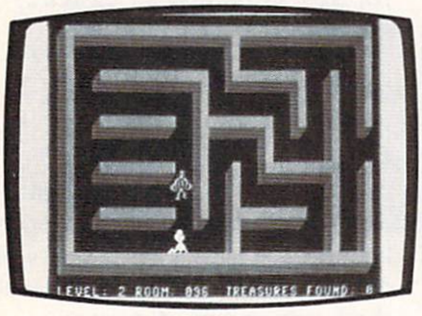
Falconian Invaders puts a laser cannon between you and wave after wave of attacking aliens.

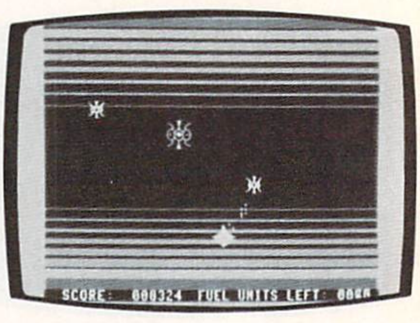
Lazer Cycles thrusts you into a colorful maze with an opponent whom you must trap before he traps you.

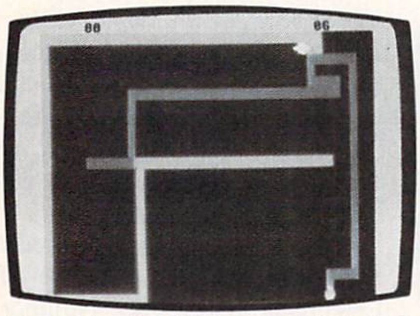
Maze Man serves up stomachsful of edible dots on a *Pac Man*-like grid.

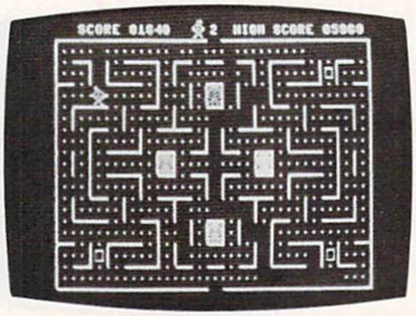
Ultrex Quadro Maze requires you to maneuver Clyde through four onscreen mazes to earn the honor of doing battle with two deadly squids.

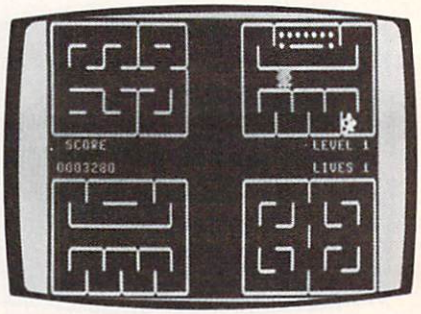
Creative Equipment, 6864 West Flagler Street, Miami, FL 33144.





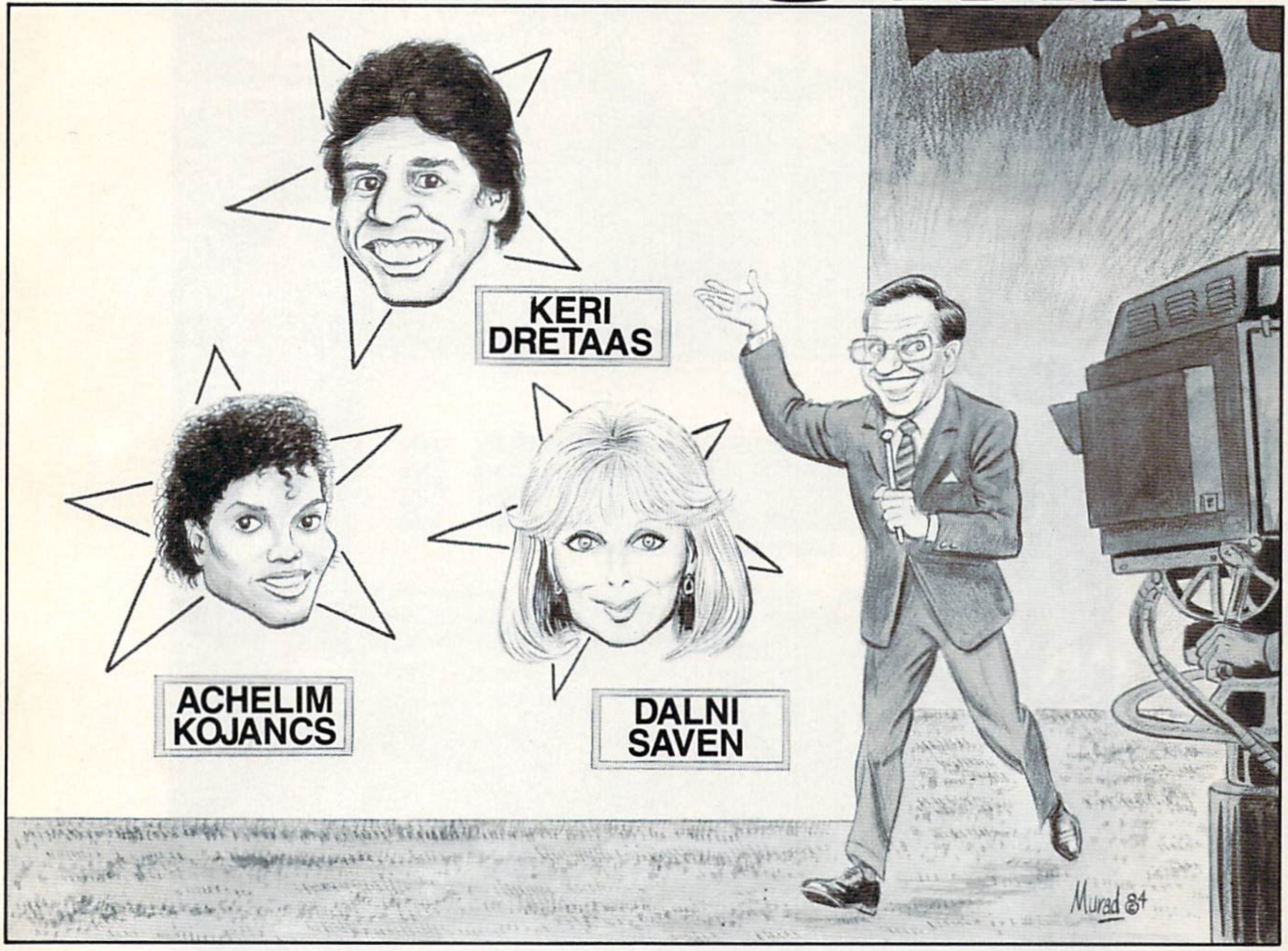






From Creative Equipment: **Tyler's Dungeons, Falconian Invaders, Lazer Cycles, Maze Man, Ultrex Quadro Maze.**
READER SERVICE NO. 121

Name that STAR



By Bob Lloret

Did you ever want to be a contestant on a T.V. quiz show? *Name That Star* for the Commodore 64 will put you in the contestant's seat.

After typing in the code, save a copy to disk or tape before running the game in case you made any typing errors.

Type RUN and hit RETURN. The first screen you see is the contestant's application. Type in your name, and you will promptly be accepted to the game. In the next screen your emcee will welcome you to the game and ask if you would like him to explain the rules. Reply "Y," and he'll give you Instructions. A "N" reply, and he'll ask you if you're ready to play and the game will start.

The emcee will give a clue to the name which is displayed in a scrambled form at the top of the screen. The cursor will then move down to "Guess" where the program will number your answer and await your response. Type in your guess and hit RETURN. If you make a mistake, you can use the cursor controls to correct your answer. Don't worry if you can't spell the last name correctly; after you hit RETURN the program will accept a correct name or will match the first five letters of your answer against the correct answer. If it matches, the emcee will congratulate you and tell you your total of correct answers. If you guess wrong, the emcee will tell you and you will be given two more chances to get the correct answer.

If on the third try you do not have the correct answer, the emcee will give it to you and go on to the next mystery name. He will continue until he reaches the last name. After your last guess, he'll thank you for playing the game and tell you what a good sport you've been.

After playing the game a number of times, you may want to change the questions. You can change the information on the data statements to whatever you want, providing you do not change the format in which they are written.

Continued on page 78



Easy Script and Easy Spell for the Commodore 64

By Morton A. Kevelson

Easy Script is a full featured word processor for the Commodore 64. With a retail price often well under $50, it is a bargain as well.

Easy Script has a bit of a colorful history which is worth mentioning. It was written by Simon Tranmer, a member of the South East Regional Group of the Independent Commodore Products User Group (ICPUG) in England. Mr. Tranmer's intent was to provide club members with a low-cost alternative to the commercial word processors which were considered to be the standard word processors for PET users at the time. As such, he set out to duplicate the operation of the commercial programs as closely as possible, eliminating the need for the users to learn a new set of commands. In the process he managed to incorporate the best features of the original programs, in particular the scrolling window of *Wordcraft80* and the command format of *Wordpro3 Plus*.

The degree of Mr. Tranmer's success was subsequently exemplified by the various rumors of commercial conflict which followed shortly thereafter. All of the alleged disputes were ultimately resolved in Mr. Tranmer's favor. As a remnant of those turbulent times we have the *Easy Spell* format command for the comment line of "nb" (from the Latin nota bene—note well) rather than "cm" a la *Wordpro*. The resultant program was distributed to the ICPUG members as *Superscript* for a price of 30£. This compared very favorably to the 275£ which *Wordpro3 Plus* and 375£ which *Wordcraft80* were selling for at the time. Commodore, realizing the quality of Mr. Tranmer's work, offered suitable encouragement. *Superscript* was modified for the Commodore 64 and thus we have *Easy Script*.

Easy Script, as the name implies, is a word processor which is easy to use. If you have worked with a word processor before, you can expect to be entering text within 15 minutes of booting the program. However, mastery of *Easy Script*, as with any full-featured word processor, will take some time. Fortunately, an excellent, virtually error-free 158-page manual is supplied with the program. The manual is divided into two parts, a very well written tutorial and a comprehensive and logical reference section. The tutorial section is well-illustrated with numerous examples, suitable for beginners as well as advanced users. The reference section is thorough and well-organized. Both parts of the manual are sprinkled with numerous cross refer-

ences to other sections of the manual. This last feature is particularly helpful during the hands-on learning stages.

Oddly enough, the package lacks a quick reference card or command summary sheet, although rumors persist regarding the existence of the former. Lack of a reference card becomes a bit of a handicap as the user becomes accustomed to the more complex features of *Easy Script*. The manual's index, although complete, is not terribly helpful due to the use of specific and somewhat unfamiliar terms for the various operations (perhaps something to do with its British origin). This means that to find a feature, the user must know what the manual calls it. This became enough of a nuisance for me that I wrote my own Command Summary Sheet. Since I expect *Easy Script* to be a very popular word processor for the Commodore 64, I have included the summary sheet with this review. Besides its obvious utility, the summary sheet will give you a very good idea regarding the capabilities of *Easy Script* and can serve as a reference for comparing other word processors.

A few words on using the summary sheet are in order. To start with, read through the manual at least once. Although I have made the sheet as complete as possible, it is not suitable for learning how to use the capabilities of *Easy Script*. I have followed the manual's convention of using the slash (/) as a keystroke separator. Do not type the slash when using these command sequences. I have not indicated when the Return key should be pressed. Hopefully this will become obvious as you use the various features. Do not try to learn or memorize all the functions at once. The best approach is simply to use the features as you need them. Do take the time to look up a feature when you come across a need for it. It may slow you down for the moment but is well worth it in the end.

As an example, consider the following keystroke

SUMMARY OF EASY

KEYBOARD FUNCTIONS

Fl	Initiates command mode
F2	Copies text in quotes to command line
F3	Text format commands (prints reverse asterisk)
F4	Initiates disk mode
F5	Capitals on/off
F6	Decimal tab on/off
F7	Tab horizontal
F8	Tab vertical
CTRL 1	Changes character color
CTRL 2	Changes screen color
CTRL 3	Changes border color
SH SPACE	Linking space
RUN/STOP	
RESTORE	Returns to startup screen

CURSOR MOVEMENT

CURSOR	Moves cursor up, down, left, right
CTRL ←	Moves cursor to previous word
←	Moves cursor to end of previous line
CTRL W	Moves cursor to next word
HOME	Moves cursor to screen home position
SH HOME	Moves cursor to start of text
RETURN	Forces new line, erases text to end of screen line
SH RETURN	Moves cursor to start of next line
Fl/G/XXX	Go to line number XXX
Fl/G/E	Go to end of text
Fl/G/999	Go to end of text space
Fl/SPACE	Moves to next screen (23 lines)
Fl/SH SPACE	Moves to previous screen
Fl/CURSOR	Starts panning in cursor direction SHIFT speeds up panning SPACE pauses panning (on/off) RUN/STOP ends panning mode

EDITING TEXT

DEL	Deletes previous character
INST	Inserts space for text
Fl/DEL	Deletes lines
Fl/INST	Inserts lines
Fl/I	Insert mode toggle (on/off)
Fl/D	Deletes range (use cursor keys & return)
Fl/E/S	Erase sentence
Fl/E/P	Erase paragraph
Fl/E/R	Erase remainder (to end of text)
Fl/E/A	Erase all text

FORMATTING TEXT FOR OUTPUT

F3	Indicates format command with reverse asterisk.
:	Separates format commands on same line
;	Separates format command from following text
F3/lmXX	Sets left margin
F3/rmXX	Sets right margin
F3/maXX	Margin release
F3/ofXX	Offset for printing columns
F3/spX	Line spacing, 0=single, 1=double, 2=triple
F3/lnXX	Skip number of blank lines
F3/juX	Right justification, 0=off, 1=on
F3/raX	Right alignment, 0=off, 1=on
F3/cnX	Centering, 0=off, 1=on
F3/plXX	Paper length (default=66 lines)
F3/tlXX	Text length (default=60 lines)
F3/fpXX	Forced page, 0=unconditional, otherwise if less than specified number of lines remain
F3/vpXX	Vertical offset from top of page
F3/hdXX:aaa,bbb,ccc	Header at specified number of lines from top of text. Three fields separated by commas are available
F3/ftXX:aaa,bbb,ccc	Footer at specified number of lines from bottom of text
F3/hlXX	Header and footer left margin
F3/hrXX	Header and footer right margin
F3/SHIFT 3	Reverse #, sets automatic page numbering in header or footer
F3/p# XX	Sets start of page numbering
F3/ps	Pause printing and displays thirty character message
F3/nb	Non printing comment line

PRINTER COMMANDS (for some printers)

F3/lp	Lines per inch
F3/lfX	Line feed, 0=off, 1=on
Fl/	Backspace
F3/ptXX	Sets pitch, 6,8,10,12,15 characters per inch
F3/saXX,D,D	Sends secondary address of XX and up to 20

sequence. Assume we have a text file on disk called "words" which we wish to load and edit. The following keystrokes will call up the file and place it in the computer for editing. F4/+/$RETURN reads the disk directory, loads it into the text buffer and displays it in edit mode. If "words" is the third file in the directory listing after the disk header, then F1/DEL/DEL/DEL/L/F2/RETURN will delete the header and the first two file names, place *Easy Script* into command mode for loading a file, transfer the filename "words" to the command line, load the file into the buffer and return to the Edit mode with the "words" file displayed and ready for editing. The entire sequence will actually take less time to perform and execute than it took you to read this description.

Text entry is free-format without word wrap. When entering text you just bang away without any concern regarding placement on the screen. When the end of the screen line is reached, the cursor continues on to the next line. Thus words will be split between two lines during text entry. This is really a very minor inconvenience as the words will be properly formatted during output, which can be the screen or the printer. More on this later.

The default display width for text entry is 40 columns, which can be expanded up to 240 columns. Display widths greater than 40 columns are handled by scrolling the text horizontally past the 40 column screen "window." The wider formats are very helpful for laying out tables and lists. Although the display width can be changed during text entry by returning to the setup screen, doing so will result in a very strange looking layout. The proper procedure is to save your text, change the display width, and reload. The procedure is really very simple because of *Easy Script's* extensive disk-handling commands.

Screen entry format is generally independent of

Continued on page 76

SCRIPT COMMANDS

	values D
Fl/[text]	Underline or enhance text
Fl/(text)	Bold or reverse text
Fl/&text%	Shadow text
Fl/!text"	Red or condense text
Fl/'	Superscript following character
Fl/,	Subscript following character
Fl/;text:	Bold printing

TABS

Fl/T/H	Sets horizontal tab
Fl/T/V	Sets vertical tab
Fl/P	Displays horizontal tabs
Fl/C/H	Clears horizontal tab
Fl/C/V	Clears vertical tab
Fl/Z/H	Clears all horizontal tabs
Fl/Z/V	Clears all vertical tabs

REARRANGING TEXT

Fl/U	Upper lower case reverse beyond cursor
Fl/R	Memorize a range of text (use cursor keys)
Fl/X	Transfer text to a new location
Fl/A	Repeat text at a new location
Fl/S	Set characters to search for. Use Fl key for replacement text to delete specified characters.
Fl/H/M	Hunt current memory beyond cursor position
Fl/H/L	Hunt linked files
Fl/H/C	Hunt linked files including current file. Continues hunt after find
Fl/@/M or L	Initiates replacement of specified characters

OUTPUTTING TEXT

Fl/O	Sets output mode followed by any combination of the following
C	Continuous output
D	Device number
F	Fill file
L	Linked file
X	Multiple copies
V	Video
P	Printer

VIEWING VIDEO OUTPUT

Commodore	Scrolls down text
Cursor left/right	Scrolls horizontally
F5	Jumps right 20 columns
F7	Jumps right 40 columns
RETURN	Jumps to column 1
SPACE	Toggles vertical scrolling
C	Moves to next page at page stop
P	Changes output to printer at page stop
V	Changes output to video at page stop
SHIFT P	Changes to continuous printing
RUN STOP	Aborts printing and returns to edit mode

MISCELLANEOUS COMMANDS

Fl/*	Toggles sound on and off
Fl/-	Soft hyphen
Fl/RUN STOP	Resets *Easy Script*. Use with caution
RUN STOP/RESTORE	Returns to startup screen. Preserves text

DISK OPERATIONS

Fl/F	Saves text file. If followed by F2 key will use first text in quotes as file name
Fl/L	Loads text file. If followed by F2 key will use first text in quotes as file name
Fl/B	Marks variable block for fill file
Fl/B/M	Marks measured variable block

DISK MODE

F4	Sets disk mode.
F4/+/$	Loads directory
F4/$	Displays directory without erasing text.
r: new file name=old file name	Renames a file
v	Validates the disk
n: disk name.XX	Formats a disk
s:file name	Erases a file

NOTES:

1. The symbols Fl, F2, etc. refer to the function keys and not the F and 1 keys. To type F2, F4, etc. use the shift key and Fl, F3, etc.
2. The slash (/) symbol separates keystrokes and should not be typed. Thus a command string such as Fl/E/S means type the Fl key followed by the E key followed by the S key. Do not hold the shift key when typing these keys.
3. Most command sequences are followed by the RETURN key. For example, the sequence Fl/G/E/RETURN will move the cursor to the end of text after the RETURN key is pressed.

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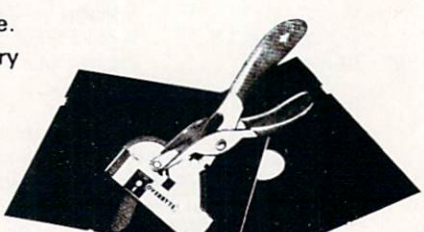
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Reader Service No. 125

By Morton A. Kevelson



Printer Interfacing
for the Commodore 64 & the VIC 20

Last month we presented a brief tutorial on the interfacing of non-Commodore printers to the Commodore 64 and VIC 20 computers. We discussed some of the hardware and software compatibility problems which exist, as well as how Commodore's BASIC communicates with peripherals connected to the serial port.

This month we provide the results of a series of tests on two printer interfaces for the Commodore 64 and the VIC 20 computers: The Tymac Connection and the new Cardco Card?/+G.

The Tymac and Cardco interfaces tested for this report were put through their paces on a Star Micronics Gemini 10X printer. This particular printer was chosen for a number of reasons. Most important is that its competitive price and full complement of features are working toward making it one of the most popular printers on the market. It is very widely distributed, making for a safe assumption that many Commodore users will consider it.

It was equally important that the printer have as many features as possible to allow full testing of the interfaces. The Gemini 10X, as the saying goes, is loaded. Among its capabilities are a snappy 120 character per second print speed, bidirectional printing, multiple character sets (italics, foreign language symbols), superscripts, subscripts, really good dot matrix print quality (especially in the enhanced and double strike modes), high resolution 480 dot per eight inch line graphics (just like the VIC-1525), and very high resolution graphics up to 1920 dots per eight inch line. It can print in condensed mode up to 132 characters per line and in expanded modes as well. The printer will even accept a downloaded character set. What it boils down to is that if I wanted to have an interface try something out, the 10X could probably handle it. On top of all this, Star Micronics intends to sell their own interface for the printer in the near future; but that is another story.

When testing the interfaces, the prime consideration was how well the printer-interface combination was able to emulate the VIC-1525 printer. Since these are graphic interfaces, considerable emphasis was given on how well they handled the Commodore character graphics. As it turned out, with regard to text, both units performed flawlessly. With regard to graphics, there are significant differences, with strong and weak points for each. There are also some differences in the specific features offered by the two units. We have included a comparison of the now-discontinued Cardco model A and its replacement, the model B. These units lack the graphic capabilities of the tested units but sell for a significantly lower price. The model B is suitable for formed character letter quality printers or dot matrix printers that lack graphic capability.

TABLE 1 - SECONDARY ADDRESS MODES

sa	1525	MPS-801	Tymac Connection	Cardco A
0	Upper case/ graphics	Upper case/ graphics	Upper case/graphics Emulate mode With LF	Upper case only, no graphics. With LF
1	n/a	n/a	Upper case/graphics Emulate mode. No LF	Upper case only, no graphics. No LF
2	n/a	n/a	Total text. Upper case with mnemonics and CHR$ codes With LF	Listing mode, upper case, no graphics, mnemonics, CHR$ codes. With LF
3	n/a	n/a	Same as above but no LF	Same as above but no LF
4	n/a	n/a	Total text. Upper/lower case, CHR$ codes, mnemonics W/LF	Transparent mode. With LF
5	n/a	n/a	Same as above but no LF	Transparent mode. No LF
6	n/a	Set line spacing	Transparent mode.	Listing mode, upper/ lower case, no graphics
7	Upper/ lower case	Upper/ lower case	Upper/lower case Emulate mode. With LF	Upper/lower case, no graphics. With LF
8	n/a	Graphic mode	Same as above but no LF	Same as above but no LF
20+	n/a	n/a	n/a	When added to above secondary address locks into that mode

Table I is a listing of the secondary addresses understood by the VIC-1525 printers and the interfaces. The important thing to watch for here is that a command to the 1525 should be handled the same way by the interface. You will also notice that the interfaces will accept several additional commands. These enhance the performance of the devices, providing a number of worthwhile features not available with a VIC-1525. Remember that both of these devices are "intelligent" peripherals. They each contain a dedicated microprocessor with an 8 kilobyte control program in ROM. The Tymac Connection includes a 2 kilobyte RAM buffer as well. The Card?/+G has a 256 byte buffer.

Examining Table I reveals that the secondary addresses are paired, with and without linefeed. This is to allow the interface to accommodate the requirements of the associated printer. Some printers require that a separate line feed (CHR$(10)) be sent after a carriage return (CHR$(13)). Other printers will automatically generate a line feed when performing a carriage return. The first condition is the most desirable, as it gives the programmer greater control over the printer. The Gemini 10X, like most current printers, has a switch which allows selection of either mode. All tests performed for this report were done with the printer's automatic line feed off.

SPECIAL FEATURES — THE CONNECTION

Secondary addresses 0 and 1 on the Tymac Connection fully emulate the VIC-1525 printer. This is done by using the graphics capability of the dot matrix printer to generate all the Commodore graphics characters as well as reverse graphics. The only limitation in this mode is the printing of reverse text characters. All reverse upper and lower case text characters are printed as normal underlined characters by the Tymac Connection.

Total text mode is initiated by secondary addresses 2 and 3. This mode is very useful for program listings which have any of Commodore's screen print control characters embedded in PRINT statements. These characters normally appear as a reverse graphics symbol in a Commodore program listing. For example, the clear screen command appears as a reverse heart symbol in a PRINT statement. Most of these control symbols are assigned a two or three letter mnemonic which is printed between brackets in a program listing. For example, CLR is the clear screen mnemonic. The Tymac interface provides 27 mnemonics. All other graphic symbols are listed by their Commodore ASCII value in brackets. The most noticeable omissions from the mnemonic list are the codes for the colors generated by the Commodore key and the number

Key: 1. n/a = not applicable
2. LF = line feed added after carriage return

Cardco B	Cardco G
Upper case only with mnemonics and CHR$ codes. With LF	Upper case w/graphics and mnemonics. With LF
Upper case only with mnemonics and CHR$ codes. No LF	Upper case w/graphics and mnemonics. No LF
n/a	n/a
n/a	Hexadecimal listing mode
Transparent mode. With LF	Transparent mode. With LF
Transparent mode. No LF	Transparent mode. No LF
n/a	Prints all characters from internal ROM character generator
Upper/lower case with mnemonics and CHR$ codes. With LF	Upper/lower case with graphics and mnemonics. With LF
Same as above but no LF	Same as above but no LF
When added to above secondary address locks into that mode	When added to above secondary address locks into that mode.

keys 1 through 8 on the Commodore 64. The VIC 20 does not have these colors and does not require the associated mnemonics.

The total text upper/lower case modes which are accessed with secondary addresses 4 and 5 are very useful for any programs which utilize the Commodore upper/lower case capability for text printing. This mode will list programs in lower case with all shifted characters printed in upper case. The mnemonics and Commodore ASCII codes for all remaining print controls and graphics symbols are still supported as above.

The transparent mode initiated by secondary address 6 is very important. This mode allows transmission of all data to the printer without modification by the interface. It is the only way to send most control codes, such as margin settings and superscripts or subscripts, to the printer. This mode will also be used by a program which handles the Commodore ASCII conversion before sending the data to the serial port.

The transparent mode can also be accessed by a hardware switch located on the interface circuit board. This feature, along with a device number selection switch, is completely undocumented in the manual. When I spoke to Micro-Ware Distributing Inc., who supplied the Tymac interface for this review, I was sent a single page addendum which explained this feature as well as some other new commands. For some reason this addendum sheet was not included with the interface which I received three months later! The version of the interface I received had a round hole, hidden under the cover label, directly over the control switches. Simply removing the label material at that point gave direct access to the switches.

As it turned out, this switch was of critical importance in printing Table I for this report. The table, which is 132 columns wide (as it appeared on my screen—not as it appears in the magazine) was composed using *Easy Script*. Trying to print the table using the Tymac interface with the Gemini 10X printer in condensed text mode resulted in a carriage return at 80 columns. This was caused by the interface automatically sending a carriage return at 80 columns when in emulate mode. The only way to get around this was to lock the interface into transparent mode with the hardware switch and set *Easy Script* into "Other" printer mode. Using this arrangement, all ASCII conversion was handled by *Easy Script* before being sent to the interface.

Upper/lower case mode, accessed by secondary addresses 7 and 8, totally emulates the Commodore cursor down mode. All graphic symbols generated by the Commodore key are printed using the printer's graphics capabilities. As with secondary addresses 0 and 1, reverse upper/lower case characters are printed as underlined characters.

The Tymac interface has several additional modes. These are accessed by sending a specific code string to the interface of the form:

```
PRINT#LFN,CHR$(27)"CMD"CHR$(N1)
```

where lfn is the logical file number and cmd is one of several possible commands from the following table. The value n1 is a parameter for the associated command.

CMD DESCRIPTION

- D Reassign device number (4 to 31)
- F Set fold. Use with W command to generate a new line if a space, > ,), or : is encountered within 10 columns of the width limit
- I Set indent. Set left margin (0 to 99)
- W Set right margin (0 to 99)
- S Display interface parameter values
- P Page command. Set number of lines on

a page for automatic pagination.

? Dump all values to the printer as their corresponding ASCII codes

L Linefeed lockout toggle. Allows software control of the automatic linefeed option.

T Locks the Connection into transparent mode.

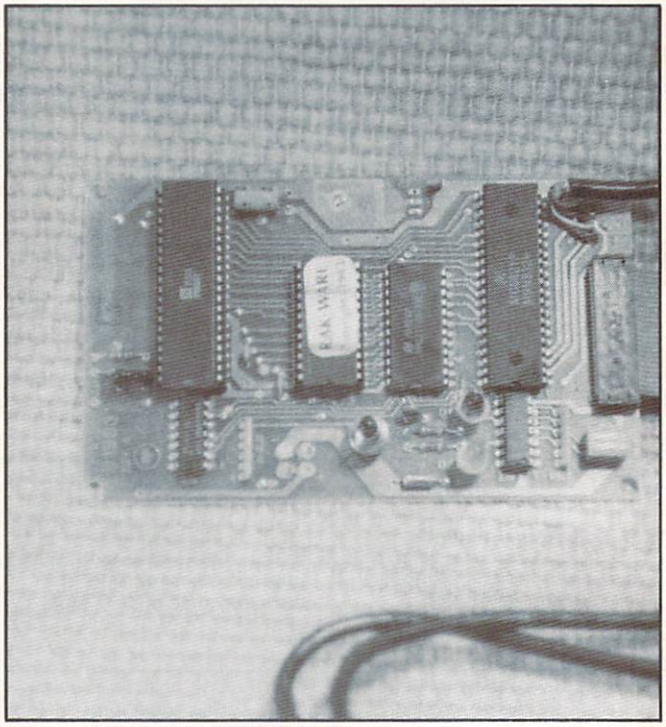
*n Locks the Connection into the secondary address specified by "n".

The last five commands were not documented in the manual supplied with the Connection. Tymac is in the process of revising the manual to include these commands. The revised manual will also include a tutorial section on using the Connection with some of the more popular word processing programs. If the "S" command indicates that you have version 1.5 or later, then drop Tymac a note requesting the Supplement to the Connection User's Guide. This supplement, which is presently in draft form, includes additional descriptions on how to use the built-in features of the interface. It also documents a macro command which allows the interface to store character sequences for transmission to the printer by a single predefined character. This is a very powerful feature which can be used to control the printer or define custom characters.

The Connection is a customized interface. It is



The Connection is programmed for a specific printer.



A view of the interior workings of The Connection.

supplied with an internal ROM that is programmed for a specific printer. Among the printers presently supported are the Star Micronics, Epson, Okidata, Seikosha, NEC 8023, C. Itoh 8510, Prowriter and the Prowriter II. Check with your Tymac dealer for the specified printer you intend to use. A Universal version of the interface ROM is available for use with formed character printers and other printers not specifically supported. This version does not produce the Commodore graphics. Tymac indicates they will be making available replacement ROM chips for users who may change printers after buying the interface.

SPECIAL FEATURES - Card?/+G

Secondary addresses 0 and 1 access the partial emulation mode. All embedded print command codes are printed as two character mnemonics from a list of 40. For an actual list of the codes, refer to the beginning of the program listing section of this magazine. All program listings were done with a Card?/A interface and a letter quality printer. All Commodore graphics symbols, other than the above command codes and some remaining Commodore ASCII codes, were printed using the graphics capabilities of the associated dot matrix printer.

Secondary address 3 produces a hexadecimal listing of all data sent to the printer. This type of list-

ing is useful for debugging and analyzing programs and print command strings.

Secondary addresses 4 and 5 are the transparent modes for direct transmission of data to the printer.

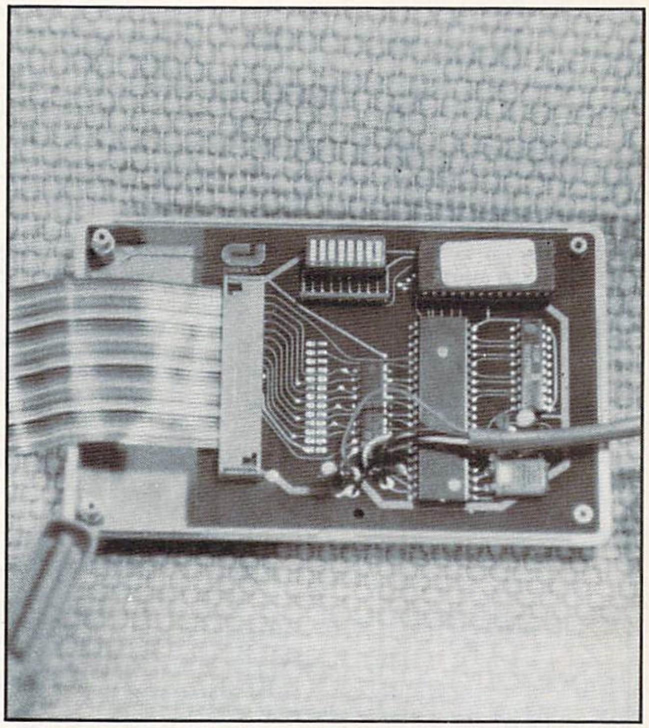
The total emulation mode on the Card?/G is accessed with secondary address 6. This mode is unusual in that all characters, including upper case text, are printed using the associated printer's graphic capabilities. The patterns for the characters are stored in the interface's internal ROM. By comparison, other interfaces will use the printer's character set for all text and punctuation symbols. Printing in this mode was extremely slow because of the way the combination of the Card?/+G and the Gemini 10X handled graphics. More on this later.

Secondary addresses 7 and 8 are similar to 0 and 1. This is a partial emulation of the Commodore cursor down mode. All upper/lower case and the Commodore key generated graphics are printed in this mode. The same mnemonics and ASCII codes as above are supported.

When 20 is added to any of the secondary addresses above, the interface is locked into that mode. The only way to release the interface is to turn it off and on again. This mode came in handy with *Easy Script*. It allowed the interface to be locked into transparent mode by using *Easy Script's* secondary address (sa) command. Unlike the Tymac interface, the Cardco does not automatically



The Card?/+G requires connection to cassette port.



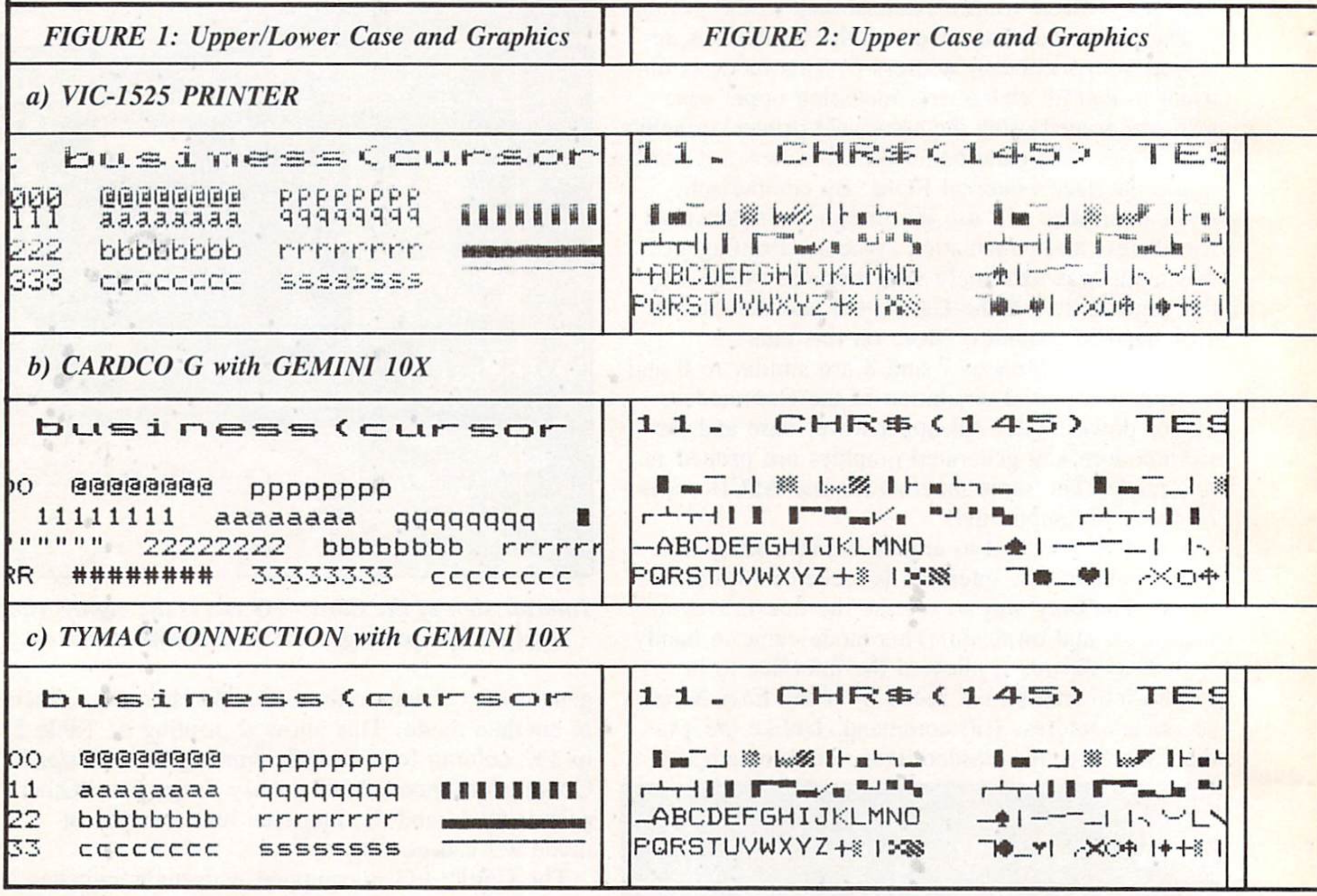
Interior view of the Card?/+G shows the eight-switch dual in line package, not visible with cover on.

generate a carriage return after 80 characters when in emulate mode. This allowed printing of Table I in 132 column format while running *Easy Script* in Commodore mode. Putting *Easy Script* into "Other" printer mode and the interface into transparent mode worked equally well.

The Card?/+G is equipped with eight switches in a dual in line package (DIP). These are accessible by removing the cover. (It would have made more sense to cut an opening through the plastic case to allow access to these switches without opening the interface!) Five of these switches allow the interface to be customized for various printers. The 10 printers listed in the manual are Epson, Gemini 10X, Prowriter, C-Itoh 8510, NEC 8023, Okidata 82, Okidata 83/92, Siekosha 100, Axiom 100, and the Gorilla Banana. The remaining three are used to set device number to 4 or 5, lock the interface into transparent mode and lock off auto line feed.

In addition to the connection to the serial port and the printer, the Card?/+G required a single wire, five-volt, power connection to the computer cassette port. A plug in circuit board extension is provided for this purpose. This was slightly less convenient than the Tymac Connection, which was powered directly from the printer and serial port connections.

TABLE II: PRINTOUT



COMPARATIVE PERFORMANCE

In general, the overall performance of both interfaces was as described above. Both units handled text with equal competence. There was a significant difference in the way the interfaces handled the Commodore graphics set. Refer to Figure 1, which is a comparative printout of (a) the VIC-1525, (b) the Card?/+G with a Gemini 10X printer and (c) the Tymac Connection with a Gemini 10X printer. These were taken from test runs using the Printer Test program on Commodore's VIC-1541 Test/Demo disk. Neglecting differences in print quality, (a) and (c) are quite similar. Referring to (b), the aspect ratio of the Card?/+G graphic characters is incorrect. A close examination also reveals an extra single dot space between graphic characters. This turned out to be a bug in the Card?/+G firmware. It causes the graphic characters, such as the bottom line symbol, to be printed with small spaces between them. Thus a solid line will become dashed.

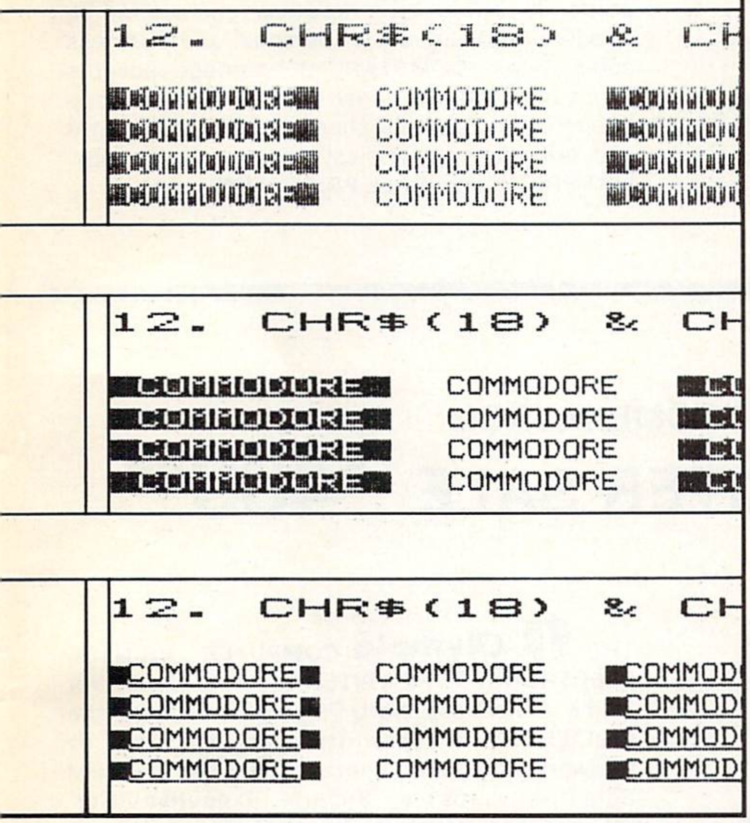
Figure 2 is from another segment of the Printer Test program illustrating the upper case and graphics set. Once again we can see the problem with the incorrect aspect ratio and the extra dot space with the Card?/+G interface.

Figure 3 shows how reverse characters are treated by the different printer interface combinations. Although the Card?/+G properly prints the reverse characters the aspect ratio is incorrect. The Tymac Connection simply underlines all reverse text characters but properly prints reverse graphics.

The Commodore graphics characters are better formed by the Card?/+G. This is a result of using a character matrix which is seven dots wide. The Tymac Connection uses a graphics matrix only six dots wide. The former is also the cause of the incorrect aspect ratio with the Card?/+G. This has to

COMPARISON

FIGURE 3: Reverse Character Test



do with the character matrix of the Gemini 10X. Each of the printer's characters is in a matrix which is five distinct dots wide. Four additional dots are overlapped between these dot spaces for a total of nine dots. This gives the characters an improved appearance. One additional dot is used as a space between characters for a total of six dot positions per character at 480 dots per eight inch 80 column line.

The result with the Card?/+G seven dot character is a better formed graphic symbol which is 16.7% too wide resulting in 13.3 extra graphics characters on an 80 column line.

Cardco has indicated that this format was optimized for the Prowriter, C-Itoh 8510, or the NEC 8510 printers. However, they are modifying the firmware to better accommodate other printers as well as correcting the extra dot problem. This modification will be available at no charge to all owners of the Card?/+G under the terms of Cardco's lifetime warranty for their products. The revised interface will have an additional hardware switch to revert back to the present mode for owners of the abovementioned printers.

Owners of the Card?/A can upgrade their interface to the +G for a charge of $40. In view of the added features of the +G, I recommend taking advantage of this offer. The updated firmware will be available about the time you read this.

Timing tests revealed some interesting results. Execution of the entire Printer Test program took 8 minutes with the VIC-1525, 4 minutes, 15 seconds with the Tymac Connection driving a Gemini 10X, and 13 minutes, 30 seconds with the Card?/+G and the Gemini 10X. A program listing of the Printer Test took 2 minutes and 22 seconds with the VIC-1525, 1 minute with the Tymac Connection, and 1 minute 4 seconds with the Card?/+G. The most dramatic differences were found with a high resolution screen dump from *Simons' Basic.* This took 3 minutes 50 seconds with the VIC-1525 and 52 seconds with the Tymac Connection. The Card?/+G would have taken approximately 40 minutes if I had let it run to completion.

A call to Cardco cleared up some of the mystery. The Gemini 10X has to be told in advance how many graphic bytes are going to be transmitted. The Card?/+G, because of its limited buffer size, sends graphic bytes to the printer one at a time. This causes the printer head to shuttle back and forth when printing graphics with the Card?/+G. The result is very slow printing of anything involving Commodore graphics or high resolution graphics. The Tymac Connection, with its 2 kilobyte buffer, is able to formulate graphic data for transmission of an entire line at a time resulting in much faster output by the printer. The above mentioned modifications to the Card?/+G may improve performance in this area as well. I will report on the results when the upgrade firmware is received.

RECOMMENDATIONS

At $89.95, the Card?/+G is a good buy for a graphic interface for the Commodore 64 or the VIC-20. Its large number of built in mnemonics makes it particularly attractive. The interface should perform quite well with the printers it has been optimized for. Owners of the Card?/A with a dot matrix graphic printer should take advantage of the $40 upgrade offer.

If graphics compatibility is important, then the

Continued on page 78

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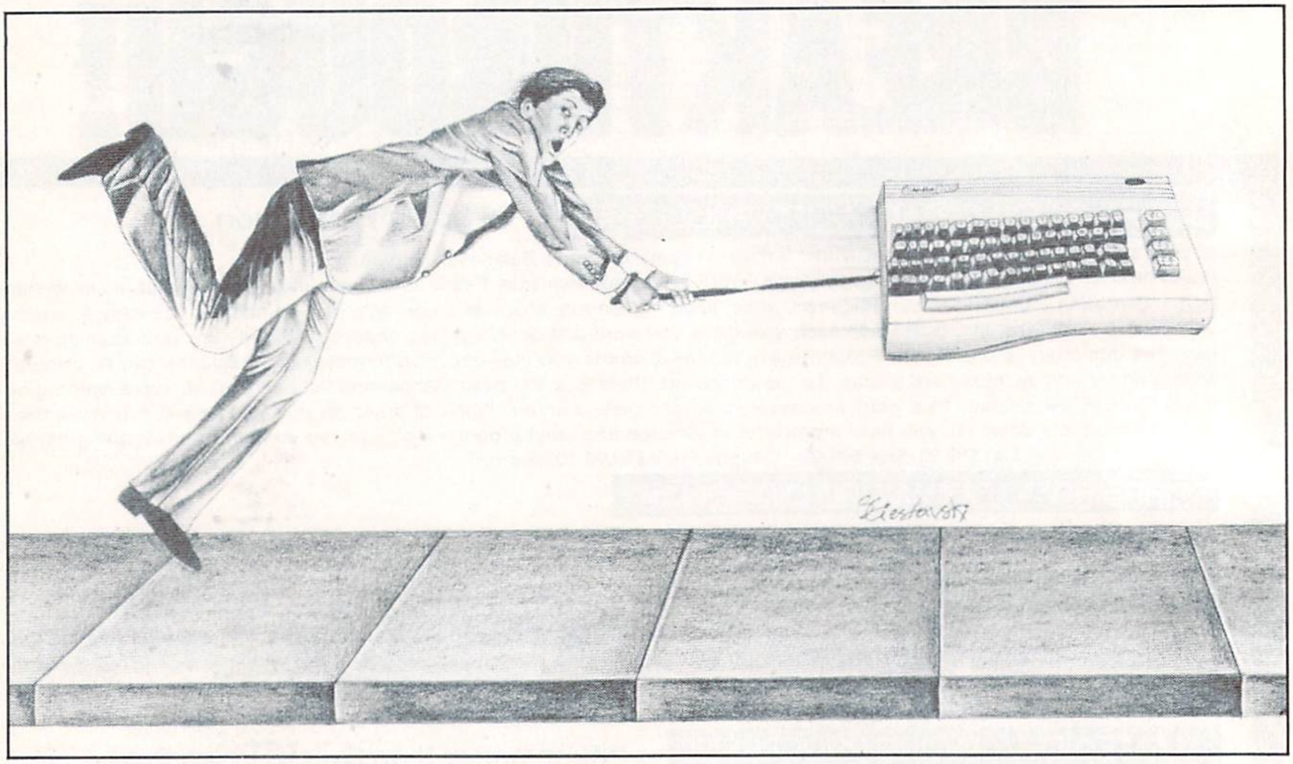
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Introduction to PETSPEED

By Joe Rotello



For many years, BASIC has been the language of choice for most programmers. It is easy to learn, fairly easy to program, and generally executes with enough speed to satisfy most of us most of the time.

For those times when we had to have faster execution, or perhaps do something that BASIC was not clearly able to do, we had to learn machine language (ML), or at least have a good friend who was knowledgeable in ML to help us.

Now, a third alternative is available to Commodore computerists—one that is literally remaking the art of programming. It's called a compiler and comes in the form of *Petspeed* for the Commodore 64 and PET/CBM Computers (retail cost $120-$150 as of 2/84).

COMPILERS

Basically defined, a compiler is a program that takes an existing BASIC program (called the SOURCE code) and transforms or compiles it into a second, faster-running program, (generally referred to as the OBJECT code). This object code may either be mostly or partially in ML but many times is a sort of machine language-like code that lies somewhere between BASIC and true ML.

Most compilers for other machines require a good interior knowledge of the compiler and sometimes even a smattering of ML on the side. In fact, you may have to know more about the compiler than you do about BASIC programming!

Enter *Petspeed.* This Commodore-compatible compiler is remarkably easy to use, generates a fast compiled code and actually improves the logic and overall structure of your BASIC source code in the process. This improvement process is referred to as "optimizing" and is a very marked advancement over most of the other BASIC compilers on the market today.

By optimizing, *Petspeed* not only compiles your existing BASIC program, it actually takes your BASIC code apart and rearranges it so that it executes much more efficiently. In fact, in many cases *Petspeed* can rework even a poorly thought out program for maximum speed. In a way, one might address *Petspeed* as a sort of intelligent compiler. This intelligence contributes to *Petspeed's* ease of use and very acceptable results.

HOW IT'S USED

The operation of *Petspeed* is quite simple as programs go, even for those who have a single drive floppy disk such as the 1541. The user merely saves the BASIC code that is to be compiled onto

the *Petspeed* program disk. *Petspeed* is loaded and run and the *Petspeed* "system" takes over from there. In fact, the user only has to inform *Petspeed* of the BASIC source code name, and away it goes.

Depending on the length of the BASIC source code, the compilation process takes between two and five minutes to complete. *Petspeed* then stores a copy of the compiled program in memory, so you can see how the compilation turned out, and saves a duplicate copy down to the disk drive.

From that point on, the compiled program appears to the computer to be just another program (displayed as PRG on the disk drive directory) and is loaded and RUN just like any other BASIC program might be.

The only difference is that the compiled program runs between 5 and 40 times as fast as did the BASIC program! *Petspeed* tacks on the file name extension ".GT" to the end of the *Petspeed* OBJECT code name so you can easily locate the compiled version in the disk directory.

As stated earlier, *Petspeed* is available for both the Commodore 64 and PET/CBM computers (4000/8000, CBM 128 and B/BX models). The method of operation is almost identical in both versions. However, the 64 version does require the user to perform a one-time multiple disk copy procedure when the programs are first received. The multiple disks are required since a single 1541 disk can not hold all the *Petspeed* programs and utilities and also hold the BASIC source code at the same time. But even here, the *Petspeed* author has provided for an easy to understand "menu" procedure that makes this one-time chore a breeze.

THE RESULTS

The results of the *Petspeed* compiler are extremely pleasing and make it worth every penny and more!

Just about every phase of a BASIC source program has been speeded up. Math work is now far faster since *Petspeed* changes all numeric material into a version that *Petspeed* can work with at lightning speed.

String manipulations like locating names and addresses in memory or on a disk drive are speeded up by a factor of at least eight times. In fact, if you have a fairly efficient BASIC source code, string manipulations can be speeded up by more than 10-15 times in many cases.

Sorting data is a real winner in *Petspeed.* BASIC sorting is always somewhat slow, even using the more advanced BASIC language sorts that are now available. Expect *Petspeed* to speed these up a minimum of 10 times. PEEK and POKE calls to any part of the computer memory, including the video screen, are speeded up dramatically as well.

Petspeed can be used to compile most existing BASIC games and business-type programs too. These programs generally become much more useful, simply due to the fact that they are executing or performing their intended task so much faster that one can get a great deal more work done in the same amount of time.

Disk and printer data input/output is also speeded up quite a bit in the compiled program. In fact, many users notice that the disk drive or printer seem to activate more frequently when a compiled program that uses those two peripherals is run. The main reason is that the "old" BASIC program has been speeded up enough so that the parts of the program having to deal with the disk and printer are reached and executed much more frequently.

ADDED ATTRACTIONS

Petspeed's many advantages do not consist of merely speeding up a BASIC program. Due to *Petspeed's* internal workings, a user or programmer can actually write programs a little more efficiently and can take advantage of a few added abilities as well.

With *Petspeed,* the computer < RUN/STOP > key can be disabled or enabled at will *without* affecting the computer system clock *or* having to code in any machine language or overly exotic program lines. Believe it or not, POKEs to the video screen can be negative numbers! This little bit of magic actually results in extremely fast video screen printings and can be used in any number of applications.

One of the more pronounced improvements is the ability to use user-defined functions that are composed of STRING functions as well as numeric. Normally, string defined functions are not allowed in BASIC. With *Petspeed,* it is therefore now possible to code into your BASIC source code a compact PRINT USING routine that will justify strings or numbers to produce a neat organized display or printout. True, it won't execute at all in BASIC. But it will when the BASIC source code is compiled!

LIMITATIONS & QUIRKS

Petspeed does have a very few drawbacks that are more related to compilers in general than to *Petspeed* itself. The BASIC source code to be compiled cannot have any statement of the type "DIM A(N)" or "DIM A$(N)", etc. The compiler has to know how much memory to reserve and therefore the N must be replaced by an actual number.

Since the program is compiled, there can be no "RUN XXX" or LIST instructions in the BASIC source code. Strings that are part of DATA statements must be shorter than 69 characters. One can get around this limitation by coding successive DATA statements each fewer than 69 characters

long.

One situation common to all compilers is that the compiled or OBJECT code cannot be listed or changed directly. In fact, if you LIST the object code program, all you see is something similar to "10 SYS(1049) COMPILED IN PETSPEED". In order to change the object code, it is required that you once more enter your BASIC source code, modify there and then compile again.

One item that imposes a severe limitation only in a few choice programs is that BASIC source code containing ML subroutines or code must be altered slightly, because *Petspeed* and BASIC differ slightly as to where variables are stored. The supplied *Petspeed* manual does offer charts and information to assist programmers in the modification of such programs; however, that section of the original manual is quite dry and limited in scope.

Our last note concerns the fact that *Petspeed*, like all compilers, stores the required *Petspeed* run time program (the compiler's own operating system) along with the newly compiled program on the disk. This leads to the observation that *Petspeed* shortens BASIC source code programs by one-half or more. However, *Petspeed* has an 8K byte overhead (the run time program) tacked on to all compiled programs. This sometimes increases the perceived program size but, during the compilation process, *Petspeed* performs checks to insure that all code will fit comfortably in the computer's memory.

EPILOGUE

We hope that you have enjoyed this introduction and review of *Petspeed.* There are many other aspects to *Petspeed,* and many ways to enhance both your BASIC source code and *Petspeed's* ability to compile it. If you would like to see more *Petspeed*-oriented articles, please drop *Ahoy!* magazine a note.

Computer consultant Joe Rotello is co-author of The BASIC Conversion Manual *and is currently working on the* Petspeed User Guide.





Welcome to *Lunar Lander,* a game for the Commodore 64 in which you control a lunar module attempting to successfully land on the moon's surface. While playing, you will notice that there are two levels, or "screens."

In the first level, you must touch down on one of the landing pads in the mountains. You have the choice of landing at either the 500 point pad or the 100 point pad. Once you have landed at both pads, however, the 100 point pad disappears, leaving a pit in its place.

The second level is reached by navigating the Lander down into the pit. In this level, your goal is to land at the 1000 point pad in the cave—a task as hard as it looks.

You can control the lander with either a joystick or keyboard. If you use a joystick, be sure it is plugged in port 2. The fire button fires your retro rockets, and left or right movement is accomplished by moving your joystick left or right. With the keyboard, the space bar fires your retro rockets and the two cursor control keys at the bottom right of the C-64 keyboard control left and right movement. If you use the keyboard, the retro rockets cannot be fired at the same time you are thrusting left or right. This limitation, however, does not apply to the joystick.

When the game is first run, you will be asked to select the gravity strength (1, 2, or 3). One is the easiest and three is almost impossible.

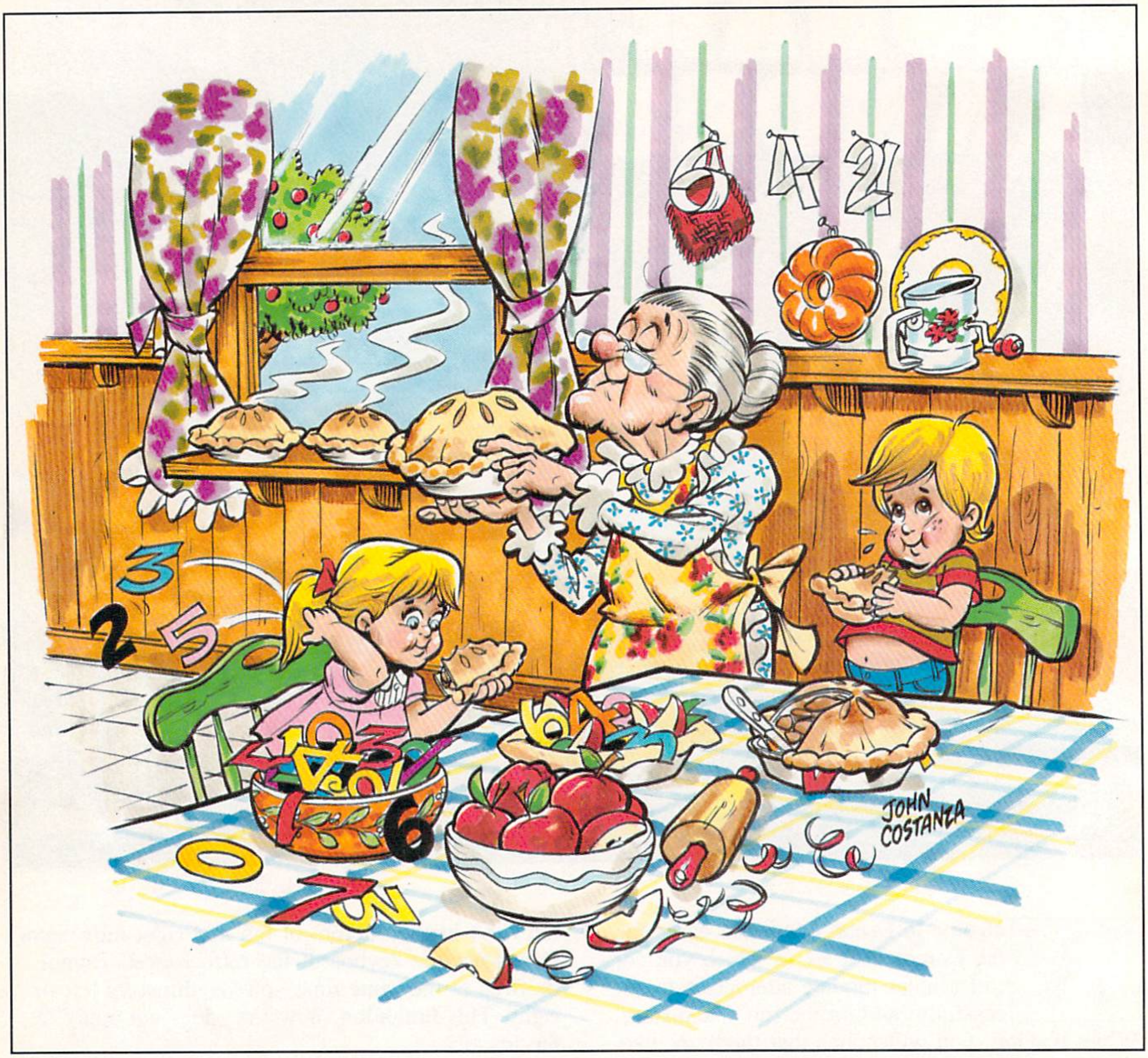
After you land or crash, press the "f7" function key to continue play.

THE PROGRAM

Lunar Lander is written in BASIC, except for a small machine language subroutine. The mountains are PRINTed onto the screen with the standard graphic characters found on the keyboard, while the lander and explosions are sprites.

While I'm not going to explain how the whole program works, I will cover some points that can be used in your own programs. The lander is actually three separate sprites: the lander with no flame, the lander with a small flame, and the

Continued on page 76



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Apple Pie

© 1983 Robert Alonso

Apple Pie is a multiplication drill program which features three different levels of difficulty and amusing graphics and sound effects. It was written for grade school students, but parents or older brothers and sisters will enjoy watching youngsters use it.

When you first run the program it will give you a choice among the easy, intermediate, and hard levels. You indicate your choice by simply hitting the key which corresponds with the first letter of your choice. For example, if you wanted to begin on the intermediate level you would hit the ''I.'' For the easy level, hit ''E.'' Once you have made your choice, the screen will clear and an apple tree will be designed on the screen. The tree comes complete with a rough bark and bright red apples. On the bottom right hand corner will be a little man, representing the user of the program. The little man will walk from the right hand of the screen to the tree and return. Once the little man returns to the right hand of the screen the program run is over and the screen is cleared. The score is then

displayed, as well as the time it took the user to attain this score. Progress can thus be measured by higher scores and by shorter times.

The multiplication questions will always appear halfway down the screen between the tree and the right hand of the screen. There is no set time limit in which the answer must be given, but promptness is desired. To answer, the user must enter his numerical answer from the keyboard and hit the RETURN key. If the answer is correct, a pleasant fanfare will sound, but if it is wrong a rather dull noise will be heard instead. The program thus gives positive reinforcement to correct answers. The little man at the bottom of the screen will move regardless of the answer.

If you decide that the program is too easy, you can change the level by just increasing the value of the variable M in lines 270, 275, and 280. If you think the program is too difficult, you can decrease the value of the variable M in the same lines. I think you'll agree that the program is very easy to adapt to your own individual needs.

I hope you have fun with this program and that someone in your family will benefit from it. If you decide that you would rather not type in the program and would prefer a ready-to-run copy, just send a blank cassette and a self-addressed mailer with five dollars to:

Nova Soft (Apple Pie)
Box 527
Nutley, NJ 07112

A verified copy will be sent to you within two days.

PROGRAM REVEALED

Line 1: Goes to the subroutine at 200 to set up the initial screen then zeroes out the timing string (TI$) and sets the variable B to the start of the letter A in the custom character set. The Variable L is set as the initial location of the little man on the screen. The offset between screen and color RAM is assigned to CC. The direction variable D is given a negative one initial value so that the little man will move from right to left. The volume register is assigned to the variable S1 and a musical tone register is assigned to S2. The variable AP is used as a counter of apples (correct answers) that the player collects.

Line 2: Exchanges character table values from ROM to new RAM locations for further customizing.

Line 3: Loads the custom characters from data statements into the custom character section of memory starting at the letter A.

Line 4: Defines the function N with variable M that's used to choose numbers for the multiplication problems at random.

Line 5: Clears the screen and sets the border color to green and the screen color to light cyan. The custom character set is also activated in this line by POKEing 36869 with 255.

Line 6-15: Routine that sets up the tree and apples on the screen. Note that almost everything is printed to the screen. Printing a screen is usually faster than POKEing it.

Line 40: Sets the volume to seven and the auxiliary color to purple.

Line 50: Sets the variable T to three and the variable S to six. These two variables are used to change the position of the legs of the little man to create the illusion that he is walking. The IF-THEN statement that follows the assignment of the variables is used to switch the variables to other values.

Line 60: This line is used in conjunction with line 50 to change the position of the legs of the little man.

Line 63: This line gets two random numbers from the function N and assigns these numbers to N1 and N2 for the multiplication problems. This line also clears the line where the problems are presented so that no errors will result from numbers being left over from the previous problem.

Line 64-65: These two lines set up the multiplication problem on the screen.

Line 66: Tests if the player answered correctly. If he or she did, then program control goes to the subroutine at line 900 and then to line 70.

Line 67-68: Tests if the player answered incorrectly. If he or she did, then an unpleasant noise is made.

Line 70: Clears out the six screen positions that the little man occupies.

Line 75: Adds the variable D (for direction) to the present location of the character and tests if this location is the left-most one that is allowed. It it is, then D is given a plus one value.

Line 77: Tests if the little man has reached the right-most allowed position. If it has, then the ROM character set is activated by pokeing 36869 with 240. The screen is cleared and a message about the time that it took the player to finish and how many he answered correctly is displayed on the screen.

Line 80-90: These two lines POKE the little man onto the screen and then color him in multicolor.

Line 100: Sends control of the program to line fifty and creates an infinite game loop.

Line 200-247: Initial screen subroutine that clears the screen, then colors the border and screen red and prints, in black, the name of the game in giant letters.

Line 248-255: Prints the name of the author and asks which level the player would like to begin on.

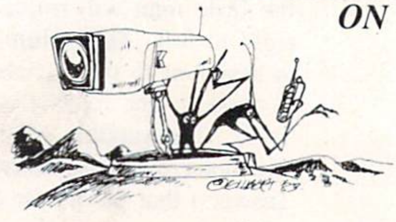
Line 265-285: Routine that tests which letter has been hit by the player and accordingly assigns the variable M with the proper difficulty value. Program control is then sent to line 290.

Line 290: Message line that indicates that an allowed letter has been pressed. The line then returns program control to the line that accessed it.

Line 500-610: Data for upper-left portion of little man in multicolor (500). Data for middle-left portion of little man in multicolor (510). Data for lower-left portion of little man (520). Data for upper-right portion of little man in multicolor (530). Data for middle-right portion of little man in multicolor (540). Data for lower-right portion of little man (550). Data for alternate lower-left portion of little man (560). Data for alternate lower-right portion of little man (570). Data for solid blocks (580). Data for curve of treeleaves (590). Data for apple shape (600). Data for rough bark of tree (610).

Line 900-910: Subroutine used to create a pleasant musical tone when the answer is correct and to keep track of the score. It also POKES an apple into the lower-right most section of the screen after the little man has made his initial move. Program control then returns to the line that accessed this subroutine.

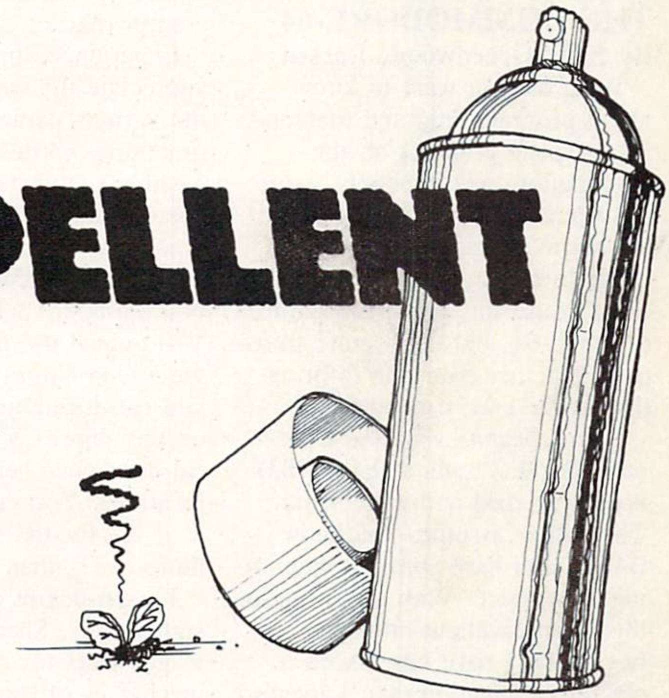
SEE PROGRAM LISTING ON PAGE 93



By Michael Kleinert and David Barron

C-64 BUG REPELLENT

An Easy-to-Use Proofreader for *Ahoy!* Programs



If you're an *Ahoy!* reader, chances are that from time to time you type in programs listed in the back. Unfortunately, man is not perfect and you've probably made errors typing them in. Another sad but true fact is that you then had to check the nonworking programs line by line, hoping to spot your errors. This has never been fun, and never will be.

In order to alleviate this situation, we've developed a system for the Commodore 64 that allows for a quick check of your program. Each line is represented by two letters. You check your code against the code listed in *Ahoy!*,. and if there is a difference, an error exists in that line. This system allows for a fast and easy error check before running the program.

In the program listings section you'll find the program we're speaking of, titled *C-64 Bug Repellent.* It is a basic loader for an assembly language program that resides at $C000 or 49152 (all you non-assemblers stop worrying and keep reading!). Before you start to type in a program from *Ahoy!*, run *Bug Repellent.* It will take care of what it has to and then disappear into a cloud of floppy disks. Once it's run, type NEW and proceed to type in the *Ahoy!* program you've selected. When that's done, save your program (do not run it!) and type:

```
SYS 49152 [RETURN]
```

You will be asked if you want the line value codes displayed on the screen or dumped to the printer. If you select printer, make sure it's on. A table of codes will be sent to your printer. If you select screen, the table will appear there. This table will move quickly, too quickly for most mortals. In order to satisfy its human operators the program allows you to pause the listing. This is done by depressing and holding the SHIFT key. To pause for an extended period of time, depress SHIFT LOCK. As long as it's locked, the display remains frozen.

Compare the table your machine generates to the table in *Ahoy!* that follows the program you're entering. If you spot a difference, jot down the number of the line where the contradiction occurs. When you're done with the comparison, go back and LIST each line where an error occurred, spot the error, and correct it.

Another nifty feature of the program is its ability to inform you as to how many lines your program is. This is another quick way to check whether you entered every line, or missed a few.

We hope our program makes computing a bit more enjoyable for you. Don't put up with disgusting bugs in your programs any longer!

(By the way, we haven't forgotten you VIC 20 users. A version of Bug Repellent for the VIC will appear in these pages very shortly.)

SEE PROGRAM LISTING ON PAGE 82

SPRITE GRAPHICS FOR THE COMMODORE-64
By Sally Greenwood Larsen

What do you want to know about programming and manipulating sprite graphics on the Commodore 64? Probably, your answer is in this book. Larsen set out to make sprites comprehensible for programmers who want to use this powerful feature of the C-64, but can't quite fit all parts together from the information in the user's manual.

Sprite Graphics for the Commodore 64 (Prentice-Hall, 1983) is easy to read and understand. The author assumes you know BASIC and have some programming experience. With that proviso, this is an excellent book for beginners. I have never seen a clearer explanation than Larsen's of how to set individual bits in a control register.

Experienced programmers will appreciate the way she separates the various parameters of programming sprites into easily digestible segments. Her tips for keeping track of what you're doing are helpful also.

For example, she recommends you define a variable (she uses V) to equal the first address on the Video Chip (53248). Then you can locate any other address on the chip as V plus the numerical difference between the two locations. You can remember V + 27 for the priority register more easily than 53275.

Larsen begins with how to design sprites. She covers both how to get ideas for a design and the mechanics of translating your design into data. She talks about combining sprites to make larger pictures, and overlapping them for special effects.

You must understand binary math, including the use of logical AND and OR Operators, to design and program sprites. The author doesn't intimidate the novice or bore the experienced programmer by beginning her book with this subject. If you need help with binary numbers or Boolean algebra, she includes a well-written, clearly illustrated chapter on the matter near the end of the book.

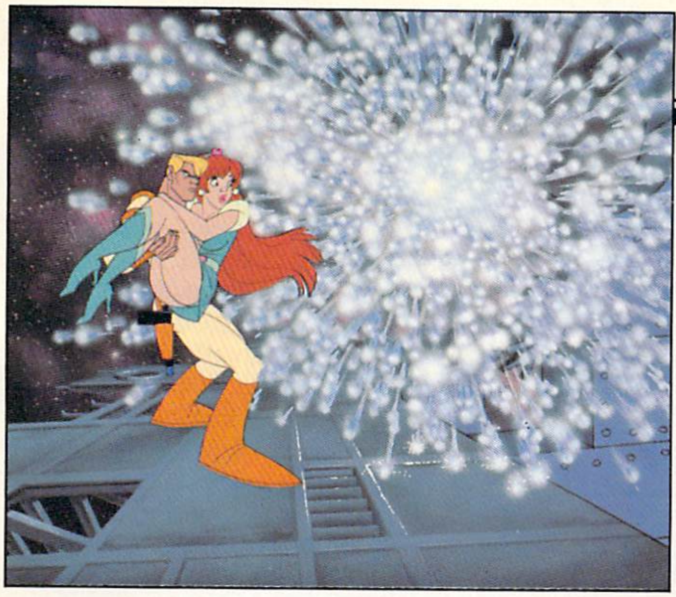
Once you have sprite data, you learn how to store it in memory and set pointers to find the data. You can program a color, turn a sprite on and off, move it around, and pass it behind or before another sprite on the screen, all by following easy, step-by-step procedures. You can create different effects with the same data by stretching a sprite lengthwise or crosswise when it is displayed.

Past the fundamentals of using one sprite, you can move into animation, collision detection, multicolor figures, and orchestrating sprites into the rest of your programs. The final section of the book addresses some miscellaneous information like turning sprites upside down, and a detailed register summary of the video chip.

Larsen's book is a joy to use. She writes clearly. Her many example programs are easy to read, and she includes extensive explanations of how they work. She also includes the data for many interesting sprites, so you can try out sprite manipulations before you have designs of your own. If you want to play with this graphics function, this book is well worth your time.

—Annette Hinshaw

Continued on page 73



By Richard Herring

PLAYING THE LIGHT FANTASTIC

Early computers, filling huge rooms with tons of electronic equipment, and the first lasers, with barely visible light emitted for tiny fractions of a second, had little in common. Certainly, the brilliant scientists who pored over theories and dreamed of applications did not imagine the marriage of the two technologies. Yet today you and I can deposit a few coins in a slot or add a few hundred dollars of components to our computer systems, and control a sophisticated device based on laser and computer technology.

It was in September of 1957 that Charles H. Townes, then a professor at Columbia, sketched his first design for a device which would shoot a beam of visible light. Over the next nine months, he and his old friend Arthur L. Schawlow, who had left Columbia to work at Bell Labs, labored over the details which would win them the first U.S. patent for Light Amplification by Simulated Emission of Radiation—the laser. By 1964, Townes had been awarded the Nobel Prize (along with two Russian scientists) for his work. Schawlow's honor came later when he and a Harvard researcher shared the 1981 Nobel Prize in physics for their laser research.

In October 1965, Bell Labs got a patent for the first solid-state, continuous-wave laser. That same year IBM received the largest pair of patents ever issued—with over 600 pages of drawings and text each—for techniques to program computers. Years later, Dr. Schawlow, speaking of lasers, would ask, "What other instrument can shuck a bucket of oysters, correct a typing error, lay a straight line for a garden bed, repair detached retinas and drill holes in diamonds?" You and I must wonder how he could leave out the application most likely to touch all of our lives—the computer-controlled laserdisc.

Dragon's Lair, of course, has brought laser-based videodiscs and microcomputer circuits, similar to commercial products you may have at home, into the headlines. In its first month at Bally's Aladdin's Castle arcade locations, the Cinematronics game increased revenues by 33 percent. But *Dragon's Lair* is hardly the first use of a computer-controlled laserdisc. And in the few short months since its introduction, it has already become "the *Pong* of videodisc-based games." What really are the capabilities of videodiscs? How are they being used with computers today? When will you be able to have all this sitting on your desk, at your beck and call?

Today's top arcade games, from *Bega's Battle* and *Crossbow* to *M.A.C.H. 3* and *Cliff Hanger,* all use laserdisc technology. Bob Loyd, who developed *Bega's Battle,* says that what laserdiscs do is put the excitement back in the games. Don Bluth, the ex-Disney animator who created the scenes for *Dragon's Lair,* describes it as "a new style of entertainment—participatory movies. . . With the three-dimensional drawings, the conflicts and threats seem closer to actual human experience. Also, the viewer is constantly being trained to be wary of the innumerable threats that surround him. In these ways, the computer ends up giving more back to the game player." All these games either replace or enhance the old computer-generated graphics with filmed or animated sequences recorded on a laserdisc.

THE LASERDISC—TECHNOLOGY'S THIRD WAVE

Laserdisc players, called optical systems, use a

laser to read microscopic pits arranged in circular tracks on the disc. As the laser shines on the disc's surface, it follows each track around, working its way from the innermost track to the outermost. The shiny surface of the disc reflects light whereever there are no pits. Picked up by the player's photo diodes, the reflected laser light is converted into a modulated signal for your TV. Each track, or revolution, of the disc stores enough information for one TV frame. With this one-to-one relationship, it is easy for the laserdisc to give you perfect stop action by just reading one track over and over. Laserdiscs can store 54,000 frames, the number of frames on a 16mm movie film, or about 30 minutes per side.

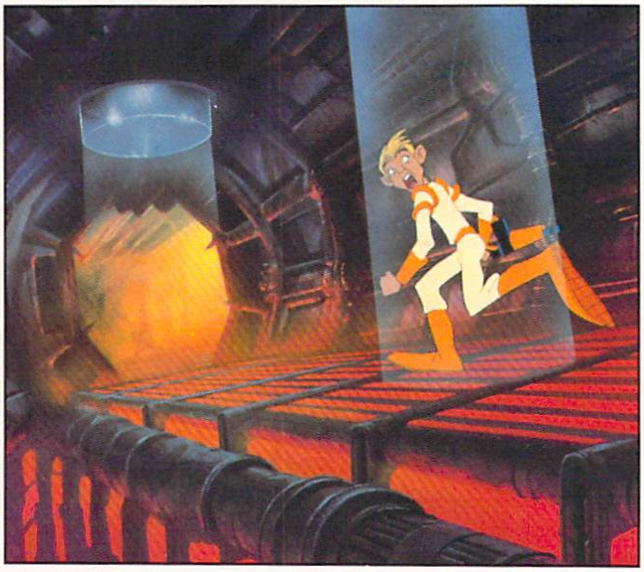
The tremendous power of laserdisc players, in addition to perfect stop action, comes from their ability to access individual frames directly. Since each frame has an identifying number, the player can jump between any two frames. If these jumps are very long, the screen may flicker or actually go blank. The early laserdisc games in the arcades suffered blanks as long as several seconds. At least one game manufacturer, Laser Games, has solved the blanking problem by using two laserdisc players in its *Eon and the Time Tunnel* game. The players operate in tandem under the control of a 16-bit central processing unit and 256K of read-only memory.

While the use of multiple players is certainly one way to solve the blanking problem, steadily improving technology provides another. As recently as September, at the 1983 Fourth Annual Nebraska Videodisc symposium in Lincoln, smaller videodisc players with improved search and audio capabilities were introduced. The new Pioneer LD-V1000 can jump multiple tracks with no disruption of the video image. Philips demonstrated its VP832 which can also jump tracks smoothly and stores data or audio on unused portions of the disc. Already we see the improved players showing up in arcade games where video displays are becoming more and more fluid.

Laserdisc players have several strengths which, combined with the power of microcomputers, make them attractive for a number of fields in addition to games. The laserdisc's visual material can be mixed with text and graphics generated by the computer. Because laserdiscs have two audio channels, one picture can have different sound tracks under manual or software control. You could learn a foreign language, with bilingual comments, or be talked through the latest dance steps, turning off the instructor's voice when you're ready to dance to the music.

The stop action capability of laserdiscs allows individual frames to hold separate pictures or pages of text. One disc can store the equivalent of several thousand magazine pages. Using slow motion, laserdiscs can help you analyze the movements of an athlete. And because discs can be divided into sections, information can be organized and cross referenced. From an on-screen menu, you could pick parts of the disc to watch, just like you select articles from a magazine's table of contents.





The evil Borf and the hulking Shag are among the dangers faced by the heroes of the **Space Ace** ***arcade game.***

There are actually four types of videodisc systems. Two systems, developed separately by RCA and JVC, read pits in the disc's surface with a device similar to the stylus of a conventional record player. The other two types of systems use a laser to read the pits in the disc. Each system uses discs which are incompatible with the other three systems.

RCA's videodisc system uses the CED format, reading discs similar to records with tiny pits in the grooves. As the disc spins, the stylus senses

changes in the pits which are eventually transformed into a signal for your TV. This system is much more advanced than a record player. Each disc has 10,000 grooves per inch—so small that dozens would fit on the edge of this page. Since the stylus actually contacts the disc, it must be replaced periodically. To keep the disc perfectly clean, it comes in a caddy which unlocks when it is inserted into the player.

The CED system is easily the simplest of the four videodisc systems. It does not need a tracking mechanism since the stylus is guided by the grooves and it has no laser which must be focused. RCA's new SJT 400 player has incorporated many of the interactive capabilities of laser systems. Each disc is divided into eight pie-shaped sectors with one video screen recorded in each groove of each sector. Between the sectors are coded signals which represent field and band numbers. With this information, the player can calculate a specific point on the disc in terms of elapsed playtime for interactive programs. One side of a disc can have up to 62 "banded" segments which can be accessed individually or played in a programmed sequence.

Bosustow Entertainment is currently developing an interactive disc to show off the capabilities of the new RCA player. but there are concerns about how well the player will respond since it depends on the contact of a stylus with the disc. Aurora Systems' Michael Heckman, whose $275 Omniscan board interfaces Apple computers with most laserdisc players, feels that the CED technology is a step backward. He wonders about a system where the stylus must jump backward one groove in order to play the same scene or to freeze the picture.

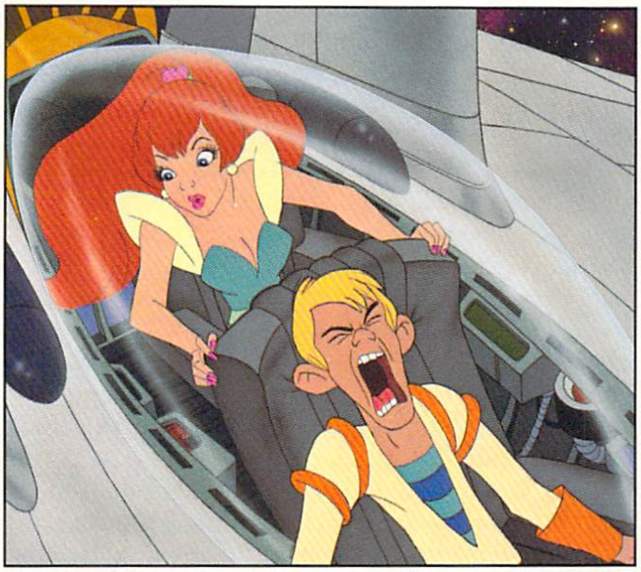
The VHD (Video High Density) system developed by JVC is almost identical to RCA's system, except that its discs have no grooves. The stylus' movement over the pitted surface is kept in line by tracking signals recorded on the disc and a tracking system built into the player.

Both the RCA and JVC players are called capacitance systems. They store several video frames, or screens, per revolution. Stop action will tend to flicker a little as the player reads these screens in order. Only by recording identical frames back-to-back (or by purchasing an optional unit for the JVC) can you get flicker-free stop action pictures.

The optical, or laser, systems developed by Philips and MCA use discs with a plastic coating over their pitted surfaces. Without exposed grooves and pits, these discs can be handled and do not need a caddy. Because the laser must not only read the right track, but also stay focused on the surface of the disc, optical players are more complex than capacitance players. Regardless, optical systems are the only ones used in today's arcade games.

A second type of optical system was developed by France's Thompson CSF. The only difference from other laserdisc players is that the Thompson system uses a clear disc so the laser can focus on either the top or bottom surfaces. You never have to remove the disc and turn it over. Thompson CSF players are priced to sell in industrial and educational settings, not homes.

Magnavox and Sylvania, both Philips companies, have recently introduced stereo LaserVision players (made by Pioneer). Looking to a future with games of unmatched realism, Philips has demonstrated the interactive use of its players interfaced with home computers like the Texas Instruments TI-99/4A and the Apple II.

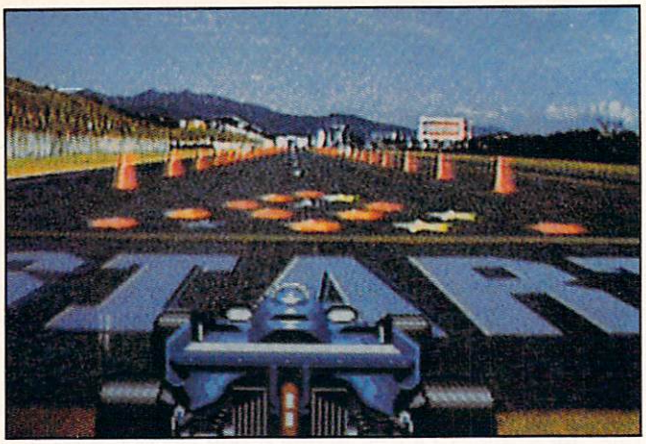




***The game is the latest laserdisc effort from former Disney designer Don Bluth, producer of* Dragon's Lair.**

LIGHT ENTERTAINMENT

Many videodisc players are programmable even without computers. Last year saw the introduction



Taito's **Laser Grand Prix,** *another laser arcade entry.*

of a number of interactive videodiscs. Optical Programming Associates, a consortium of MCA, Philips, and Pioneer, brought out several discs including *How to Watch Pro Football* and *The First National Kidisc.* The football disc uses basically a game film approach which stops the action so you can try to call the next play correctly and alternates between the two audio channels so you hear different descriptions of the same play.

The First National Kidisc is an example of using a laserdisc player's capabilities to compress a tremendous amount of material onto a single disc. With twenty-six different entries, the table of contents lets you pick topics from knot tying to riddles, from dinosaurs to xylophones. Using only one minute of actual disc time and a lot of stop action, the disc can teach you to fold twelve different paper airplanes. Or, by switching between audio channels, you can listen to a girl explain the essentials of Pig Latin—in English or in Pig Latin.

Then there are interactive videodisc games for adults. Bosustow Entertainment has produced several laserdiscs for Optical Programming Associates. In *Party Games,* John Byner plays off a group of improvisational actors and actresses to show you how to do charades. You are also challenged to write original captions for cartoons and to identify ink blots.

Bosustow has also done *Mazemania,* a series of four games, including *Blast Off* which uses stock NASA footage and *Battlestar Galactica* scenes. Bosustow expects, because of their qualifications as animators and gamemakers, to do some laserdisc arcade games. Their first products will probably be live action with a little animation added. Concerning the future, Nick Bosustow says, "The only thing I see is a general education of the consumer as to exactly what laserdiscs and interactive programs can do. We used to write stories with a beginning, a middle, and an end. Now we're writing stories that have five beginnings, sixteen middles and one hundred and fifty ends."

LEARNING WITH LASERS

It is not surprising that educators also have been involved in much of the work on interactive videodisc technology over the last several years. In Utah's videodisc valley, the University of Utah at Salt Lake, Utah State University, and Brigham Young University have researched automated teaching systems to enhance or even replace traditional classroom instruction. Their computer-aided instruction (CAI) programs let people learn at their own pace and may actually improve learning. Since the quality of images is considered a key to learning, laserdiscs, which have better pictures than other audiovisual media available to educators, are a natural for CAI.

The Minnesota Educational Computing Consortium (MECC) is probably the nation's largest governmental computer education organization. For years, it has been a source of quality educational programs for microcomputers including Apple, Commodore, Atari, Radio Shack, and IBM. The Special Products Division of MECC has just completed its first microcomputer and videodisc interactive course, titled Introduction to Economics, under a Rockefeller Family Fund grant.

This seven-week course of self-paced instruction gives students feedback, extra help, and reinforcement. Designed to run on an Apple II and a laserdisc player, the course includes the interface, disc, computer programs, and manuals. The real beauty of such systems is that a wider variety of courses will eventually be offered even in rural schools. The courses come complete with their own expert instructors (on disc) and do not depend on a certain minimum enrollment.

Regardless of the advantages for education, the cost of producing videodiscs remains a drawback. At commercial rates of several thousand dollars for each minute of material, producing a disc is not like typing in a few dozen lines of BASIC code. First, all source materials—slides, film and artwork—are edited onto a videotape. Titles and captions are added and individual frame numbers are

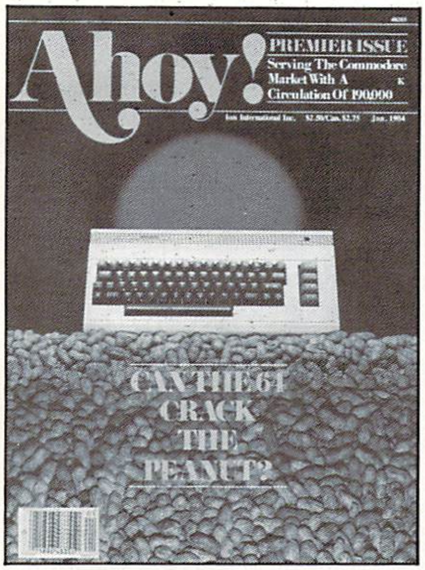


With graphics this convincing, who needs to drag race?

Ahoy! Back Issues

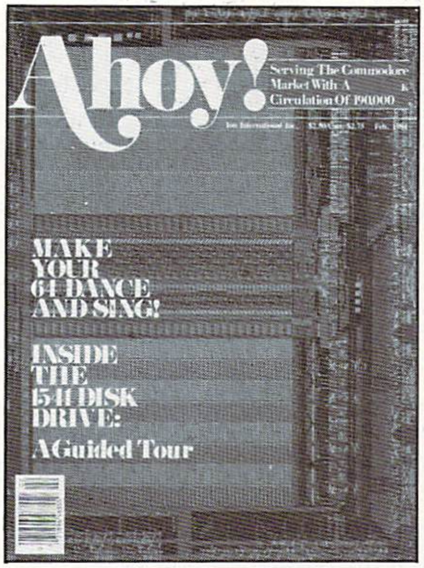
Sure, you're a dedicated *Ahoy!* reader now—but what about any issues that might have seen print *before* you climbed on board? Can you compute on in total confidence without a complete collection of *Ahoy!* and the programming strategies and software and hardware analyses each issue provides? Can you rest secure in your knowledge of the Commodorean world without reading all our feature articles, industry updates, and regular columns? Can you hold onto your four bucks in good conscience knowing how short we are on closet space?

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Party Games ***from Bosustow Entertainment is an adult-oriented laserdisc suggesting over eighty fun activities, such as*** **Tug of War** ***pictured above.***

encoded. Then a master disc is created at a cost that, depending on the complexity and amount of material, can easily exceed $10,000. From the master, discs can be pressed, much like the way records are made, for $10 to $20. The major expense is really the development of the coursewear.

According to Michael Heckman, who markets a computer/laserdisc interface, video production is the real bottleneck in the system. The programming is easy. Connecting the hardware is a snap. But artists who can design and finish the work are in short supply. Lynn Kusdorf, a software engineer for Interactive Television Company in Virginia, agrees that interfacing the equipment is no big deal. His company designs surrogate travel and training packages. One program, written for a grocery chain, teaches you how to prepare seafood. Others have taught people how to get from place to place in large buildings. When learners get lost, at least the first few times, they will still be sitting at their desks.

For videogamers, the ultimate in CAI may be a simulator designed under a U.S. Department of Defense contract by Perceptronics in Woodland Hills, California. *Tank/Gunnery Trainer* uses actual film of perspective views from inside a tank. But computer graphics are used for scenes like direct hits on the tank since no camerman, apparently, wanted to shoot the scene. This trainer is a much cheaper way for servicemen to gain experience than lumbering around in a real tank, firing explosive shells at live targets. Just as important, the trainer is entertaining enough that it has been placed in Army post dayrooms so training continues even during off-hours. You probably won't see this one in the local arcade, so enlisting may by your only choice.

A real hotbed of interactive videodisc research is the Videodisc Design/Production Group at the University of Nebraska. Since 1978, they have created dozens of discs on a wide variety of topics. Initially funded to develop applications for deaf people, they produced the first videodiscs with closed captions. The overlay of text on the video image allows hearing-impaired children to play a series of sleuth games. Then there are smaller private companies like Videodisc Publishing in New York. They released a videodisc tour of the National Gallery of Art, featuring thousands of single frames which show just about every painting in the Gallery's extensive collections.

PUTTING IT ALL TOGETHER

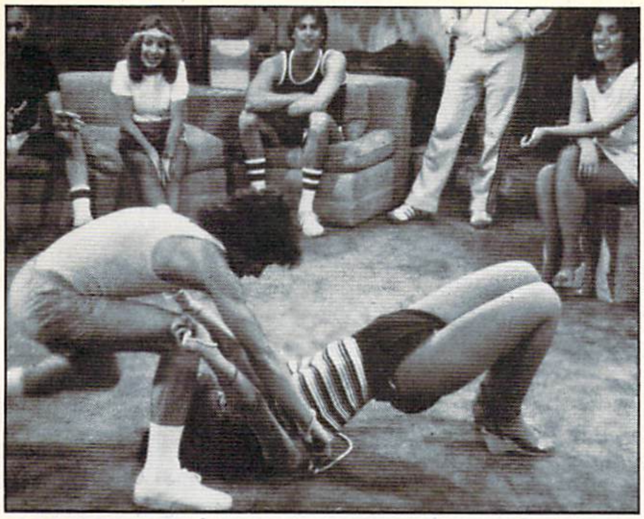
Actually, there are several ways to combine the powers of computers and laserdisc players. The simplest is merely to have the computer select a sequence of scenes from the disc. If you love the wordplay in *The Sound of Music* but cannot abide the singing, you might determine each point at which Julie Andrews breaks into song and program the computer to skip over those parts of the disc. You could, however, do all that sitting back in your easy chair with just a remote control.

The next step in complexity is to have the computer jump to different scenes on the disc based on your input. *Cliff Hanger, Dragon's Lair,* and similar arcade games do exactly this. The computer monitors the input devices—joystick and fire buttons—at specific points in the story. You get a short time (which gradually decreases through the game) in which to hit a control. Based on your action, the computer either continues playing the disc or jumps to a different scene on another track. Still an unsophisticated use of the computer, these games use the computer only as a timer and for simple branching decisions.

Many people, like Robert Patton, are critical of this method of using videodiscs for interaction. Patton's company, Entertainment Sciences, brought out



Gorilla my dreams—**Party Games' Marshmallow Kiss.**



Knotty problems arise from **Party Games' Tied Up.**

the game *Bouncer.* He describes *Dragon's Lair* as "a follow me here, follow me there kind of scenario." His game's graphics are someplace between conventional technology and laserdiscs—16 times more memory than usual and 600 different character images for fluid animation. "The problem with new technology is that graphically a lot of things are possible, like the laserdisc has shown us, but practically, the gameplay has taken a step backward. There is a tradeoff in giving people better graphics and effects, but also giving them less of what they really want—believing that they're part of the story."

We are beginning to see computer/laserdisc systems which make more substantial use of the computer's power. Mylstar Electronics of Northlake, Illinois has released a laserdisc arcade game called *M.A.C.H. 3* (for Military Air Command Hunter). In *M.A.C.H. 3,* you see, through a Fresnel lens, actual film of flights over plains and bayous and through mountain passes as you pilot your jet fighter or bomber. Using a joystick controller, you manuever your plane on the screen and fire at targets.

The trick here is that your plane and many of the targets are generated by the computer and overlaid on the filmed sequences. Rather than being a glorified controller for the videodisc, the computer is an integral part of the game in *M.A.C.H. 3.* One of the best effects occurs when a computer-generated target, say an enemy artillery piece, appears in a canyon. As you fly over, the artillery piece gets larger, but it keeps its relative position "in" the cannyon. Although there is no three-dimensional effect from the computer graphics, just seeing the computer image track the videodisc display is impressive.

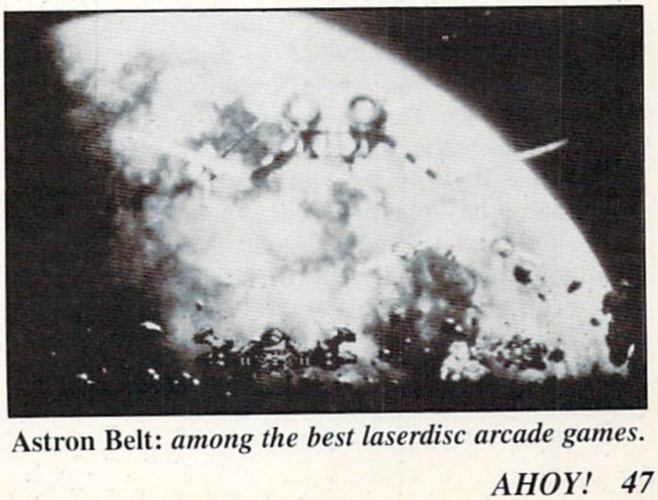
An even more sophisticated example is the American Heart Association's Cardiopulmonary Resuscitation (CPR) Learning System. Using Resusci-Annie CPR training figures implanted with more than a dozen sensors, the computer monitors the effectiveness of the rescuer's CPR. The computer actually considers over 6000 variables to distinguish proper patterns of the timing and depth of chest compression and inflation of the lungs. At hundreds of different points in the course, the computer program can branch to the videodisc and display a physician describing exactly what you are doing wrong.

Since it constantly monitors your performance, the computer can adjust the course to your demonstrated ability. Although each CPR Learning System costs $20,000, they do cut instructor time by ½ to ¾ and allow novices to learn CPR in less than four hours. At least seven more interactive videodiscs to teach cardiac life support techniques to various medical professionals are planned. Other medical techniques, such as the insertion of catheters, have also been discussed as possibilities for teaching with computer/videodisc systems.

One of the advantages game developers and educators find with videodiscs is that they can be switched almost as easily as home movies. Data East's manager, Bob Lloyd, points out that their laserdisc games, beginning with *Bega's Battle,* will be interchangable as new games come out. Noting that "there are eight or nine laserdisc games out now, and some of them are just bad games," Lloyd is optimistic about the excitement in *Bega's Battle.* All the gaps in play occur between its 43 scenes, not during them. Mylstar's *M.A.C.H. 3* is also designed for future conversion to new software.

EXPLORING THE CREATIVE LIMITS

As you can see, we are approaching systems where the computer and the videodisc are virtually indistinguishable components. Years ago, computers and terminals were clearly separate. The computer was the board or boards with the CPU and RAM chips. The terminal was the keyboard and screen. Today, as more and more microcomputers come with keyboards and even screens and disc drives built in, we have come to think of the most



Astron Belt: *among the best laserdisc arcade games.*



Maze games will never be the same after **Astron Belt!**

basic computer as more than just a circuit board. In the same way, the features of computers and videodiscs are beginning to blend.

And you really don't have to wait. Sony has demonstrated its new SMC70 computer which can generate color overlays for videodisc applications. In fact, Interactive Television in Virginia has been using the Sony videodisc player along with Sony micros. If you have an Apple computer, you can set it up to control almost any laserdisc by adding the Omniscan from Aurora Systems in Madison, Wisconsin, or the VMI from Allen Communication in Boulder, Colorado. For Atari computers, New Media Graphics in Cambridge, Massachusetts offers the Discmaster to control a Pioneer laserdisc. There are also systems or interfaces available from Positron in New York; Wicat Systems in Orem, Utah; Sanders Associates in Nashua, New Hampshire; and Video Associates Labs in Austin, Texas.

Although no one has announced a laserdisc controller for the Commodore 64, given the immense popularity of this computer, a controller can not be far off. Just one step away, Videobook Corporation has announced its Promethius I. This system includes the interface necessary to connect a C-64 to a Panasonic 6500 videocassette recorder. Software to allow the recorder to be operated under the C-64's control is also part of the system.

C-64 owners who just cannot wait for a laserdisc interface can, for a price, use one developed for the Apple. Pioneer Software has a package which allows a C-64 to run Apple II software using a 1541 disk drive. This Apple emulator system consists of three parts. The buss gives you eight standard Apple II peripheral slots, four C-64 expansion slots, and a heavy duty power supply. A CPU card plugs into the buss and translates the Apple software you run. Another card transforms your 1541 into an Apple-compatible drive. With this system, which will probably start at $600 or more, any of the Apple laserdisc interfaces and software should run on a C-64.

Coleco claims to have plans to release a home videodisc player in the near future. Based on the trouble they have had with Adam, their home computer, some people doubt their ability. However, Gene Fairly of Videodisc Publishers predicts that the development of a videodisc unit designed for playing games in the home "is going to happen very fast."

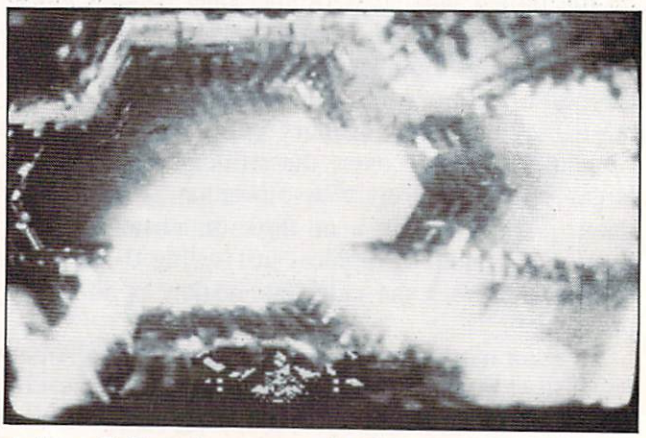
The computer's voracious appetite for data is ideally suited by the laserdisc's capacity to warehouse millions of pieces of information. Today's videodisc arcade games show only a fraction of the power available from computer/laserdisc systems. Although they may seem state-of-the-art to us, these games are based on the same technology which educators and trainers have been using for the last five years. Systems are already available for home use and you have every right to expect that their shortcomings—expense and lack of off-the-shelf games and applications—will soon be overcome.

Just what does the future hold? Nolan Bushnell, who created the first *Pong* game and founded Atari, is interested in building an arcade unit which can take you on a trip—complete with the sights, sounds, and smells of a foreign land. He sees the videogame moving in the direction of a "participatory novel." Atari and MCA have a joint venture, called Studio Games, for new games cloned from the Universal film library. These will eventually include arcade and home computer laserdisc games.

Entertainment Sciences' Patton thinks, "We're heading toward an environmental concept where you can go into an arcade and sit quietly inside a really nice cabinet with lighting, special effects, stereo or quad sound, and have your fantasy take place in another world." Laser Games cofounder Thom Kidrin says they plan a laserdisc jukebox from which you will select the adventure you want. He envisions a system "that'll be like traveling through a painting, into a land of Dali or a world of Escher."

Or. . .where no man's imagination has gone before.

Continued on page 79



Astron Belt *makes even a deathstar trench seem real.*

WHO PROGRAMMED J.R.™?

By Steve Springer



Not the person to run into in a dark oil field.

Many of today's television programs lend themselves so conveniently to the videogame medium that you can almost see the merchandising gears turning in the heads of the network executives as they signed on the series. It doesn't require even a TV writer's imagination to come up with a plausible game scenario for a show like *The Dukes of Hazzard* (race the sheriff and pop wheelies) or *The Fall Guy* (scale building walls.)

But a soap opera?

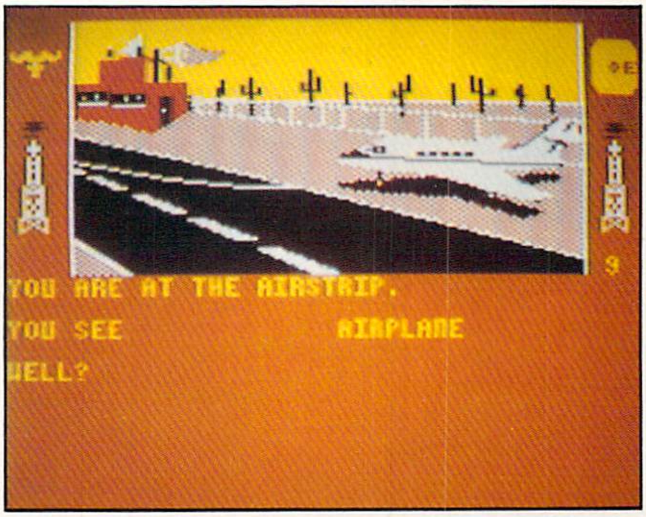
One thing about living in a capitalist economy like ours: if there's money to be made, nothing is impossible. That's why, due to the success of both the Commodore 64 and the *Dallas* television show, a game starring everyone's favorite drawling cutthroat will soon be lining software shelves.

Still—a soap opera? Even a nighttime one—and even one as popular as *Dallas?*

The game's appearance will not seem miraculous at all once we point out that the gameplay does not consist of shooting J. R., or racing *Donkey Kong*-fashion up and down stairways and across landings in South Fork. *The Dallas Quest* is a prose adventure—the second from Datasoft.

For those who've never played a text adventure, they consist of typing messages into the computer and getting information back on the display screen. Generally, the messages you type indicate your going somewhere, doing something, or requesting a clue. As you progress, you will begin to piece together the solution—but you also risk encountering situations that will end the game suddenly.

The sustained popularity of *Dallas* made it a natural for an adventure game adaptation. As enjoyable as it may be for a player to become acquainted



All kinds of dangers lurk at isolated airstrips.

with the completely unfamiliar characters and situations served up by the typical prose adventure, the instant character identification he will experience with personalities in *The Dallas Quest* will lead to quicker involvement. Plus, there's undeniable appeal to the idea of participating in an adventure with characters one has previously been familiar with only on a passive level.

A *Dallas* adventure game is such a good idea, in fact, that it may seem strange to be coming out now, several years into the series' success. But the fact is that while *Dallas* has been a ratings topper for many seasons, prose adventures have only recently attained their current peak of popularity. Gauging the widespread appeal of both the series and the genre, Datasoft proposed the idea for a game combining the two to Lorimar Productions, producers of *Dallas*.

After licensing the rights to their characters to Datasoft, Lorimar provided them with a script prepared by a pair of screenwriter's assistants working on the show. This programmer James Garon translated for the computer, but with a twist: the game is a mix of text and graphics.

According to Mitch Junkins, product manager for *The Dallas Quest,* the marriage of text and graphics is long overdue. "It's the feeling of Infocom and some other companies that produce prose adventures that the graphics haven't matured to the extent where they can be used with a prose adventure," he says. "Datasoft feels very strongly against that. We think the combination of visuals and graphics adds a whole new dimension to gameplay. Datasoft is a pioneer in the joining of the two in adventure games."

The mix of text and graphics, says designer Garon, comprises a picture of where you are in the top of the screen, with the text occuping the bottom half. "There are over 40 different scenes," he says. "A few have animation, but



Playa Peligro—haunt of the famed "Chugalug" Jones.

mostly, it's a visual aid to tell you where you are."

A great deal of care was lavished on the rendering of the characters, which Garon did not feel up to tackling alone. "Professional artists were hired to do the rendering—I did the translating," he says. While five or six series regulars are mentioned over the course of the game, few make screen appearances, with the exception of one scene towards the end of the game that features the entire family.

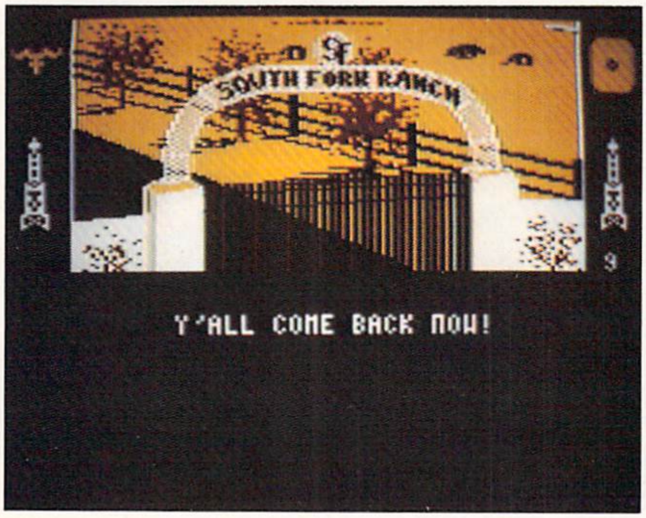
One character you will see often is Sue Ellen. It is with J.R. Ewing's spirited wife that the adventure begins.

"You are a famous detective," begins the supplied background description. "As the adventure opens, you have been summoned to South Fork for a meeting with Sue Ellen. She has called you here to offer you a proposition.

"She is in possession of a letter from Jock Ewing to Miss Ellie which describes an extremely rich oil field he has discovered during his stay in South America.

"When Jock left on his ill-fated trip back to South Fork, he carried a copy of this map with him. But he also took the precaution of leaving a copy of it with an old, old friend and former fellow wildcatter named "Chugalug" Jones who now runs a trading post in South America in a village called Playa Peligro. Should anything happen to Jock, Chugalug has been instructed to give the map only to the person who possesses a particular ring. This ring was enclosed with the letter; also enclosed was a snapshot of Chugalug.

"Sue Ellen explains that she wants this map for herself. She wants to become financially independent of J.R. so that if he begins pulling any of his old tricks she can use her own wealth either to make him behave or finance her escape from him.



If you make it to this screen, you've beaten J.R.

Continued on page 76

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By Morton A. Kevelson

Lower Case Descenders with the VIC 1515/1525 Printers

As with most of Commodore's products, the VIC 1525 printer represents an attractive choice for many users of the VIC 20 and the Commodore 64. It is a full-width 80-column printer which uses standard-size tractor-feed paper. Most important, it is directly compatible with both the VIC 20 and Commodore 64 without the use of an external interface. The printer is a dot matrix type capable of printing the full Commodore character set (text and graphic symbols). Graphics mode is fully supported for doing dot programmable printing such as high resolution screen dumps.

The print quality, while not ideal, is acceptable for many applications such as program listings, file handling, and word processing. The most annoying deficiency in the printer's character quality, from my point of view, is the lack of lower case descenders: the tails of the lower case letters g, j, p, q, and y. These characters, formed without descenders, float slightly above their neighbors as printed by the 1525. Particularly annoying is the lower case "p" which is very similar to the upper case variety. Text printed on the 1525 seems to be liberally sprinkled with upper case "p's" in the midst of words and sentences.

I first started using the 1525 printer in the fall of 1982 with the VIC 20. The word processor I was using at the time was really nothing more than a sophisticated line editor. Since it was written in BASIC, I decided to enhance the character appearance of the printer by using the programmable graphics capabilities. The resultant routine improves the text appearance by using the graphics cabability of the 1525 to form lower case descenders. The technique used illustrates the use of the graphics mode for the creation of any type of character set.

The actual characters are printed by two passes of the print head. The first pass prints all the characters without descenders and the upper part of any characters requiring descenders. The second pass completes the descender portions as required. Printing is done in text mode, switching to graphics mode for the custom characters. At the end of a line the printer is switched to graphics mode causing the next line feed to position the paper for printing the descenders. The descender string is composed of spaces and the descender graphics. Since all line feeds are done in graphics mode, the resulting text is printed at 4½ lines per inch instead of the usual 6 lines per inch for single spaced text.

The most significant penalty when using this routine is a substantial loss of printing speed. The first delay is caused by the BASIC routine which scans the text for characters requiring lower case descenders. The most significant delay is caused by the printer itself. The 1525 printer has a 90 character input buffer. It is designed to print all text whenever the buffer is full. When the buffer is empty, a carriage return without line feed is performed, the buffer is refilled, the printhead returns to the last print position, and printing resumes where it left off. Since each custom character replaces a single byte character with nine bytes, an 80 character line will usually exceed the capacity of the input buffer. This will result in four passes of the printhead for a single line of text: two passes for the character line and two for the descender line. The 1525 can address 480 discreet points on a single horizontal line, which would result in six passes for a full graphics line.

Referring to the listing, a string of text is entered at line 430 using an INPUT statement. The characteristics of the Commodore INPUT statement preclude the use of commas or colons at this point. Doing so will result in the EXTRA IGNORED message being displayed with the loss of subsequent text. If you wish to use commas or colons, be sure to enclose the input data in quotes. The inputed string is checked for characters requiring lower case descenders in lines 450 to 520. Lines 530 and 540 assemble the character string (P5$) and the descender string (SU$). Line 550 adds standard characters.

The character string is sent to the printer by line 580 prefaced by a CHR$(17) which sets upper/lower case mode and followed by a CHR$(8) which sets the printer to graphics mode (9 lines/inch). The descender string is transmitted by line 590. The leading CHR$(15) sets the 1525 to upper case mode and is required by the 1525 to switch out of graphics mode.

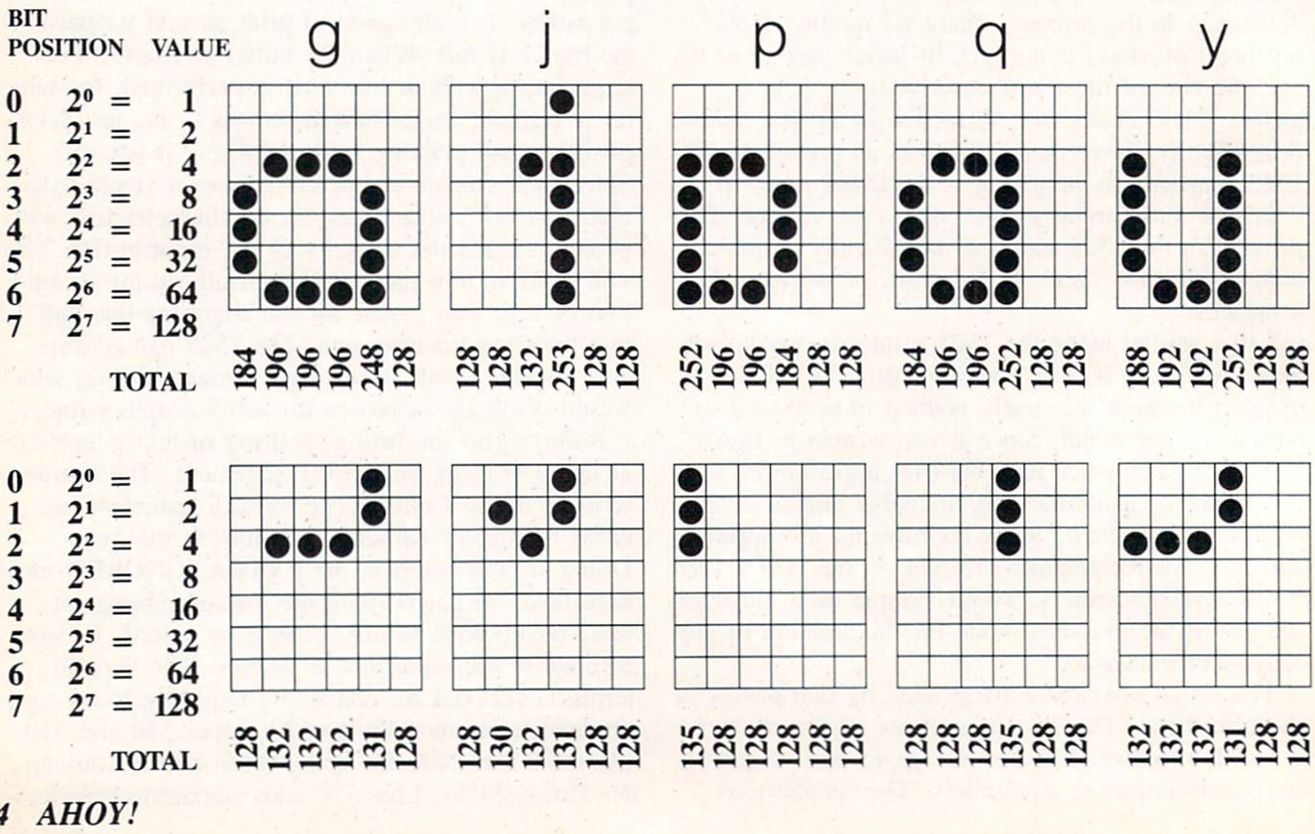
A total of ten custom characters are defined by the DATA statements of lines 180 to 270 and the FOR . . . NEXT loops of lines 280 to 390. Each data line consists of nine values. The leading eight set the printer to graphics mode. The trailing 15 and 17 reset the printer to upper/lower case mode. The second through seventh values are the actual custom character data. These quantities are derived as shown in Figure 1. Each graphics position on the 1525 consists of seven vertical dots corresponding to bits 0 to 6 of the transmitted data byte. In addition, bit seven must be set, adding 128 to the transmitted value. Each character position on the 1525 is six dots wide. Using the upper part of the "g" as an example, the first byte is formed by adding 8+16+32+128=184. The blank position at the end is sent as 128. These codes are transmitted using BASIC's CHR$(X) function.

This graphical procedure may be used to calculate CHR$ codes for any type of graphics or custom character sets. The same approach will work on both the 1515 and 1525 printers and for the VIC 20 and the Commodore 64 as well. Note that only the VIC 1525E printer will function properly with the Commodore 64.

Since the program is written in BASIC, it can be easily appended to any other BASIC program as a subroutine. If you intend to do this, note the following limitations. BASIC strings can contain a maximum of 255 characters. Since the routine stores the text as a BASIC string, an 80 character line is limited to 21 characters with descenders. Trying to print more than 80 characters with a single string will force a carriage return and line feed on the 1525. This will of course mess up the alignment of the upper and lower halves of the custom graphics. If you will be handling text strings with more than 80 characters, they will have to be broken up into smaller chunks before being passed on to the routine. This can readily be accomplished with BASIC's LEFT$, MID$, or RIGHT$ commands. □

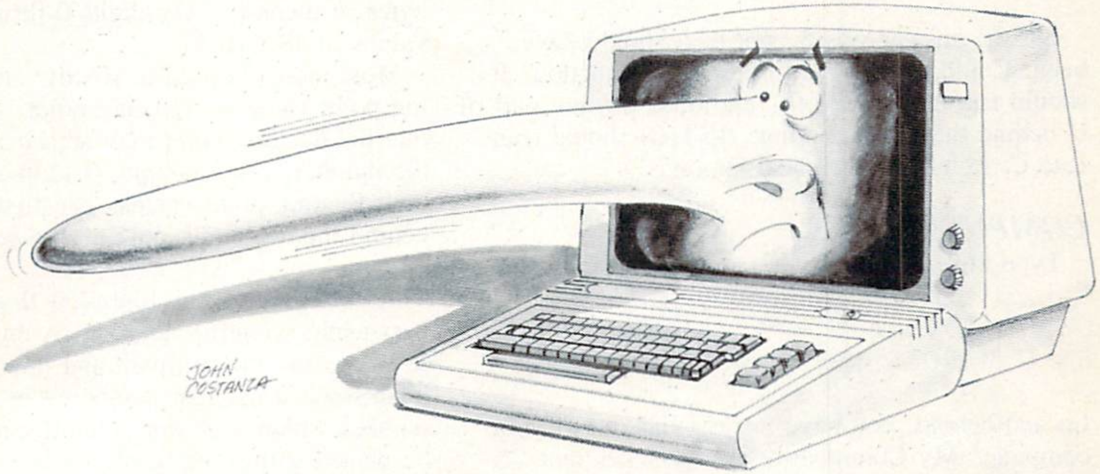
SEE PROGRAM LISTING ON PAGE 94

Figure 1: Derivation of Custom Character Quantities



RUPERT REPORT

The Noble Lie



An Article on Mathematical Programming

By Dale Rupert

Does your computer ever lie to you? It is generally accepted that "computers never make mistakes, only people do." But is that really true?

This month we'll look at some of the mathematical capabilities and limitations of the computer. We'll see some examples where the computer's answers are misleading and some cases where they are just plain wrong.!

I wanted to write a program which would find Pythageorean triples. A Pythageorean triple is a set of three integers A,B, and C which are related by the formula A*A + B*B = C*C. Perhaps in geometry you learned that the squares of the two legs of a right triangle add up to the square of the hypotenuse. That is the Pythagorean Theorem, and hence the name Pythagorean triples.

If C^2 equals A^2 plus B^2, then C equals the square root of A^2 plus B^2. That is easy enough to implement on the computer. All the program has to do is pick values for A and B, calculate C, and see if C is an integer.

The following program should do just that:

```
5 REM PYTHAGOREAN TRIPLES
10 FOR A=1 TO 50
20 FOR B=A TO 50
30 C=SQR(A*A + B*B)
40 PRINT A ; B , C
50 IF C = INT(C) THEN PRINT A;B;C
" IS A TRIPLE!"
60 NEXT B
70 NEXT A
```

Line 10 assigns the integer values 1 thru 50 to A. B is given values ranging from A thru 50 for each value of A. B will always be greater than or equal to A. That way A and B will have the values 2 and 3, for example, but we won't waste time checking 3 and 2. The value of C is calculated in line 30. Line 40 just lets us know how far along the program is. The heart of the program is line 50. There we determine if the number C is equal to the integer part of C. If so, C must be an integer. Since A and B are always integers, and if C is also an integer, we then have a Pythagorean triple.

No doubt the most famous right triangle is a 3-4-5 right triangle. It is easy to see that 3,4, and 5 form a Pythagorean triple:

3*3 + 4*4 = 9 + 16 = 25 = 5*5

Consequently, I was most surprised when I ran the program and the numbers 3 and 4 flew right by on the screen without any indication that they were part of a triple. After carefully checking the pro-

gram, I concluded that the computer really wasn't doing what it should be doing.

There is frequently some uncertainty in calculations on a computer or a calculator. I suspected that the square root function was the culprit. In the direct mode, I typed the following line:

```
PRINTSQR(3*3+4*4)
```

But the answer was 5, just as it should have been. Could the problem be the INT function? It should take the value of C and drop off any part of C behind the decimal point. (INT(C) should truncate C, to use the technical jargon.)

COMPUTER LIES

Type this and see if you can explain the results:

```
C=SQR(25):IF C < > INT(C) THEN PRI
NT C " DOES NOT EQUAL" INT (C)
```

Lo and behold, you have made a liar out of your computer! My Commodore clearly states that "5 DOES NOT EQUAL 5"!

I was actually more interested in getting a list of Pythagorean triples than I was in figuring out the innards of the C-64, but this problem is intriguing. We must assume that "SQR(25)" and "5" are stored differently in the computer, even though their values are displayed identically on the screen. Consequently, we must use a more sophisticated means of comparing the two values.

Change line 50 in the program above to be:

```
50 IF ABS(C - INT(C)) < 1E-5 THEN
 PRINT A;B;C" IS A TRIPLE!"
```

This line looks for a difference btween C and INT(C) which is smaller than 1E-5. Now the program works as desired.

But wait a minute. What is this 1E-5? If you already know the answer, bear with us while we take a look at number representation in BASIC.

NUMBERS IN BASIC

Numbers may be stored three different ways in BASIC: string, floating point, and integer formats. A number (or a numeral) stored as a string is treated as a string character. For example, if A$ equals "2", then A$ + A$ equals "22", not "4". That is the concept of concatenation we discussed last month. Sometimes it is handy to represent numbers as strings. They are easier to take apart and rearrange using string functions.

It is possible to convert the string numeral into an actual numerical value with the VAL function. If X = VAL(A$), then X+X does equal 4. The STR$ function works the other way around, changing a numerical value into a string. In string format, each digit is stored as its ASCII equivalent. The string "23" would be stored as 50 51 in two bytes of memory. The digits 0 thru 9 have ASCII values of 48 thru 57.

Most numbers used in BASIC are stored as floating point values. "Floating point" refers to the fact that the decimal point may appear anywhere within the number. For example, 0.1234 and 123.4 are both floating point values. The first has four digits behind the decimal point and the second has only one.

In BASIC you may represent floating point numbers using scientific notation. A number is written in two parts: the mantissa and the exponent. The mantissa is a decimal number. The exponent is a number which tells where the decimal point should be placed within the mantissa. We may write 1.234 as 1.234E0. The "E0" implies that the decimal should be moved zero places from its current position. The number 123.4 could be written as 1.234E2, which says: move the decimal point two places to the right of its current position in the mantissa.

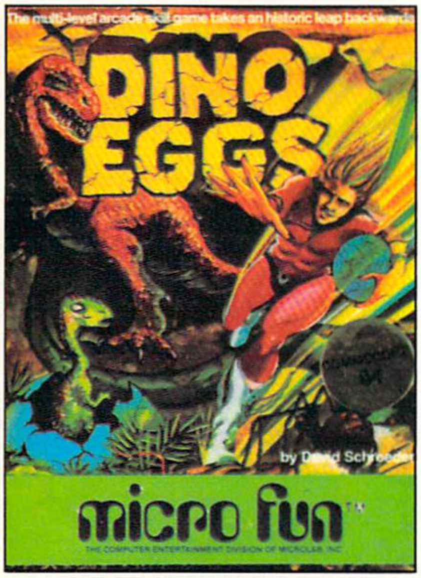
All of this looks absurdly cumbersome, and it is for the numbers we've discussed. But consider the numbers 1,234,000 and 0.00001234, and the importance of floating point notation is more evident. These numbers can be expressed as 1.234E6 and 1.234E−5. The "E6" means "move the decimal



"MAAA! Gloria's getting personal with the personal computer again!"

Continued on page 74

REVIEWS





DINO EGGS

Micro Fun
C-64
Disk; Joystick

With *Dino Eggs,* Micro Fun has finally answered the question, "What ever happened to the dinosaurs?" It seems they were visited by Time Master Tim, a renowned time traveler from the year 2047 A.D. On one of his prehistoric visits he accidentally infected the dinosaur population with a deadly strain of twenty-first-century measles.

In order to save the dinosaurs from certain extinction, you must travel back to the Mesozoic Era and rescue as many dino eggs and baby dinosaurs as possible by bringing them back through the time warp to the twenty-first century. As Time Master Tim, your mission will be made difficult by primitive life forms such as proto-snakes, proto-pedes, and falling proto-spiders, as well as the young dinosaurs themselves. Contact with any of these will cause Tim's eventual "devolution" (he turns into a spider) if he fails to escape through the time warp.

In addition, the adult dinos don't fully appreciate Tim's efforts to save their young from extinction and will periodically crush him underfoot if he remains on the mountainside too long. The only way to keep these angry parents away is by building a fire out of wood that is scattered around.

Tim is controlled with a joystick. The action button is used for jumping, kicking boulders down the mountainside, picking up or putting down eggs and wood, caging baby dinos, or eating Power Flowers. These increase the number of eggs Tim can transport through the time warp from three to unlimited.

While you can warp-out to the next skill level at any time (there are ten levels in all), you lose points for all eggs left remaining on a mountainside. Points are also subtracted for each dino egg that you accidentally abandon, burn, contaminate, or smash with a falling boulder.

Although all of the game's randomly generated screens appear to be similar, there is enough of an increase in difficulty from one level to the next to keep most gamers on their toes. For example, when you reach levels three, four, and five, the proto-spiders will try to abduct the baby dinos before you have a chance to rescue them. Also, during the later stages of the game, Tim's biological system becomes more sensitive to contamination and devolution occurs much faster.

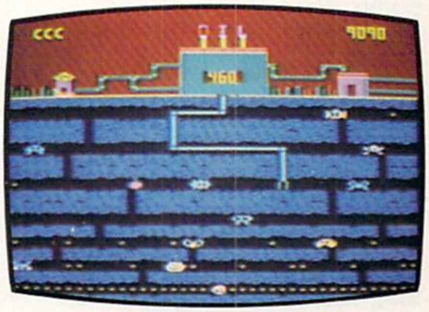
The run, jump, and climb genre of games is pretty tired and familiar by now, but this one is well-dressed and eager to please. If you are looking for a game with a sense of purpose that combines first-rate action with a touch of humor, *Dino Eggs* is worth considering.

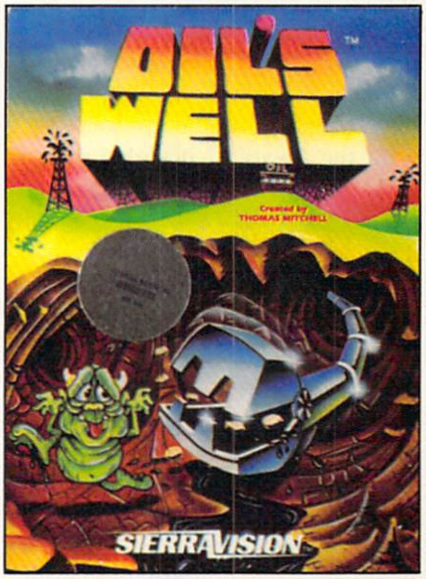
—Lloyd Davies

OIL'S WELL

Sierra On-Line for the C-64
Disk; joystick

In *Oil's Well* you're in control of a drill bit, anxious to mine precious oil pellets locked in underground passageways in order to complete the construction of an oil refinery. The joystick controls the movements of the drill down vertical wells and across horizontal passages, and the action button sends the drill snap-





ping back home.

Your adversaries are called "Oozies." They wear many different faces, but all must be either destroyed or avoided. The Oozies can be dispatched by drilling right into them, but should one cross your pipe, you've suddenly lost a game life. In addition to the Oozies, Land Mines roam the underground catacombs, and have a reverse effect on gameplay: they can pass harmlessly through your pipe, but if your drill bit touches them, they explode.

Each drill bit has a "life" of nine hundred ninety ticks on the counter. If you haven't cleared away all the oil pellets by the time the counter reaches zero, you've lost another drill bit. However, additional drills are awarded for each ten thousand points gained.

While the object of play remains the same throughout all eight levels of *Oil's Well,* it is, nevertheless, a satisfying game. The onslaught of Oozies is bound to confound seasoned players (and absolutely baffle newcomers), but with patience, planning and quick-thinking, no screen is impossible to conquer.

It's difficult to get used to the idea that the drill is retracted via the action button; players will have a natural tendency to retract with the joystick. It's also difficult at times to maneuver around corners and between walls which are nestled together in later screens—but this in itself provides much of the challenge of the game. Graphics and sound are serviceable; gameplay is, in my experience, unique.

I got the shaft. . .and I came back for more. Recommended.

Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614.

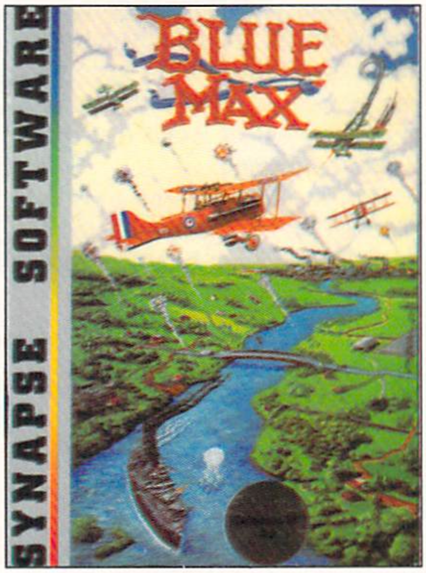
—Randy Palmer

BLUE MAX

Synapse Software
C-64
Disk; joystick

In *Blue Max,* you, in the persona of R.A.F. pilot Max Chatsworth, bomb enemy buildings, strafe tanks and gun emplacements, and down enemy planes.

You must pilot your World War I biplane through enemy territory—first along a river, then





down a road, and finally through a city—bombing, strafing and dogfighting as you go. The play is similar to *Zaxxon.* The screen scrolls diagonally from upper right to lower left. Although you can fly high or low and bank left or right, you cannot force the screen display to scroll in any other direction. During flight, your altitude can be judged by "eyeballing" the distance between the plane and its shadow. The same is true for enemy planes.

In *Blue Max,* you can choose to play at any one of three skill levels. Also, you can select how the plane will react to joystick control. The plane can either climb when the joystick is pulled back, like a real plane, or drop toward the bottom of the screen, as happens in most games. Finally, you can choose whether or not gravity will affect the plane. With gravity, the plane will gradually lose altitude when the joystick is in the center position. If no gravity is selected, the plane will change altitude only under joystick control.

The text window in *Blue Max* displays information essential to the game, though not in a "control panel" format. Amount of fuel and bombs remaining are shown as well as speed and altitude. Your speed during flight remains at 200 mph. (It was not until 1917, when planes were equipped with double motors of over 200 horsepower each, that this speed was actually achieved.) Your altitude can range from zero to 105 feet, although at 20 feet or below you will crash. (In reality, altitudes would have to be 10 times higher.) *Blue Max* allows you to strafe ground objects when you fly at altitudes of 21 to 25 feet. Real WWI planes flew only as low as 200 feet for strafing. If you crash, are shot down, or successfully complete your mission, the screen will display your score and your final rank. Ranks range from *Kamikaze Trainee* and *Runway Sweeper* to *Flying Tiger* and *Squadron Leader.*

This is one of the few games I have played in which you get on-

ly one life. If an enemy plane crashes into you, your plane is shot down, or you fly too low, that's it—the game is over. Actually, this adds a touch of realism and has not been frustrating to any of the players at my house.

Blue Max creates a good 3-D effect with the graphics for buildings, ships, bridges, etc. The plane's shadow, however, remains the same distance from the plane even when you pass over a building or a tree. This would be very difficult to fix, but does detract from the 3-D effect. There are excellent sound effects for falling bombs, machine guns, cannons, plane motors, and even a splash if you mistakenly bomb the river. There is a lot of movement in *Blue Max,* but much, perhaps too much, of it is fine detail. Propellers spin, machine guns blast, shells explode, etc. Occasionally, I found myself wishing for more action. No, not more action—*bigger* action.

Since each enemy plane flies in only one direction, you will not do much real dogfighting, but there is a lot of airborn activity in *Blue Max* nonetheless. Bob Polin has done an exceptional job; this is one game that is really addictive.

Synapse Software, 5221 Central Ave., Richmond, CA 94804

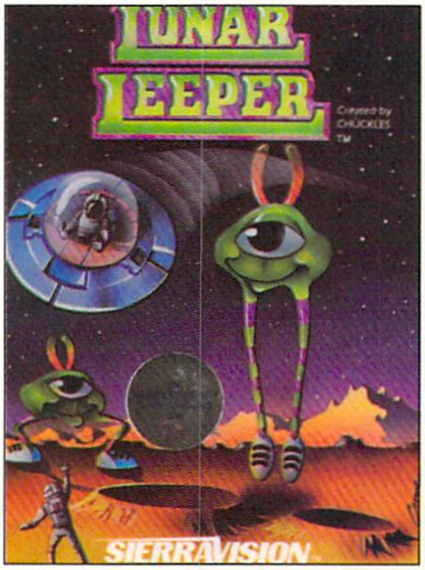
—Richard Herring

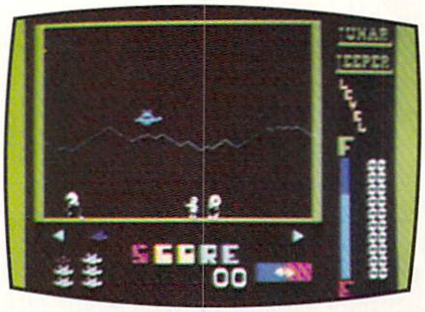
LUNAR LEEPER

Sierra On-Line
C-64
Cartridge, disk; joystick

A Leeper (an eyeball on stalk-like legs) is the lovable bouncing host of the children's game *Learning With Leeper.* That particular Leeper must have been born in captivity or heavily tranquilized. Leepers, as it turns out, are—in their native habitat—voracious, crafty and merciless creatures. From Mister Rogers to Mothra in one leep, as it were.

In this game, the crew of an errant spaceship are stranded in the Valley of the Leepers on the planet Opthamalia. In the first screen (a modified horizontal streak-and-shoot type), you attempt to scoop up the crewmen and drop them to safety one by one before the Leepers can sidle up and devour them—all the





while avoiding the Leepers yourself. In screen two, you navigate through narrow tunnels, fighting off Trabants in an attempt to destroy a giant eyeball.

Learning *Lunar Leeper* can be a frustrating experience. Your rescue ship has no brakes, which is just as well since you can't gather much speed. You run out of fuel at an alarming rate; more often than not, you will find yourself far from a refueling station, losing speed and beginning to tumble Leeper-ward. Meanwhile, the Leepers are devouring crewmen, snatching your ship.

The game's strong point is personality. You'll thrill to the Leepers' graceful pliés, their malevolent shuffle, the whoop that accompanies their flight. You'll weep at the ineffectual arm-waving of the incompetent crew. But be advised: personality has to carry the day. With no graphic or gameplay breakthroughs and a lack of variation or long-range playability (even though there are seven levels), there is less here than meets the eye, cornea as that may sound.

Sierra On-Line, Inc., Sierra On-Line Building, Coarsegold, CA 93614.

—Tim Moriarty

LEARNING WITH LEEPER

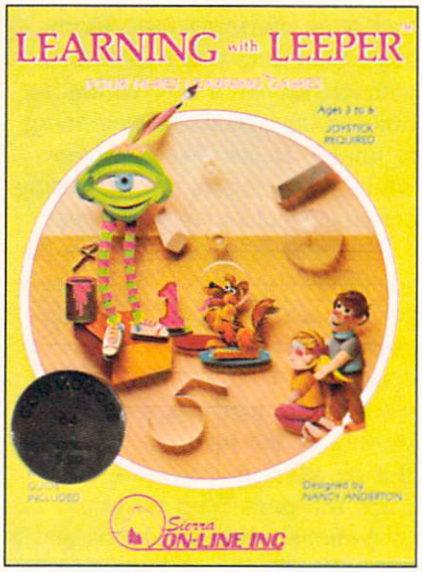
Sierra On-Line
C-64
Cartridge; joystick

Learning With Leeper is designed to develop reading-and-counting-readiness skills, directional concepts and visual creativity in children ages three to six. It is actually four games in one.

In *Dog Count,* anywhere from one to ten dogs will appear on the screen. It's up to the child to "feed" the dogs by selecting the number of bones that corresponds to the number of dogs and wagging tails.

Balloon Pop is a symbol-matching exercise. Of a group of four letters or symbols, one must be selected which matches a fifth, with the reward being a sprightly musical tune.

The object of *Leap Frog* is to move a frog through a simple



maze "with minimal wall collisions," ostensibly to challenge the child's eye-hand coordination.

Screen Painting is not a game, as such, but an activity. A line sketch of a house with a mountain backdrop is presented, and the child "colors" the scene by maneuvering the cursor over the selection of eight colors and from there to the area to be filled. Additional lines can be drawn with the joystick.

Our board of advisors was divided on this program. Randy Palmer's preschooler stuck with one answer throughout the *Dog Count* game, no matter how many dogs appeared or how many times he was prompted or threatened; he didn't get the point. The frog maze was much too easy and the painting exercise much too cumbersome. The child fled to his crayon box as soon as he was released.

Bob Sodaro's six-year-old consultant, however, loved every portion of the game, was completely absorbed in it, and had to be forcibly removed come the dinner bell.

This old geezer can only add that *Leeper* offers colors, sound, consistent control, bright rewards and friendly corrections. . . and Sierra On-Line is no fly-by-night company.

Sierra On-Line, Inc., Sierra On-Line Building, Coarsegold, CA 93614.

—Tim Moriarty

FINAL ORBIT/ BUMPER BASH
Sirius Sofware
VIC-20
Cartridge; joystick

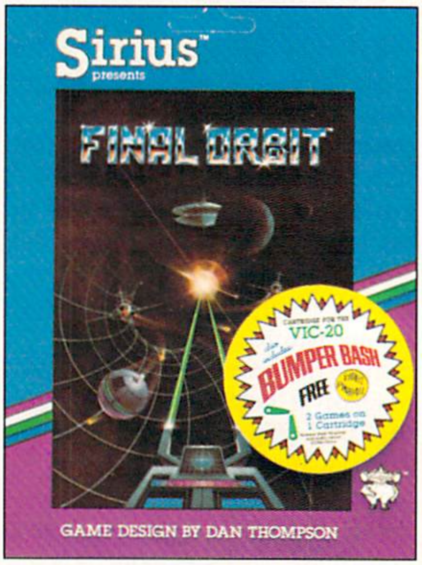
Putting two games on one cartridge is a good idea; I'm surprised that it hasn't caught on. Xonox tried it with Atari VCS games; their games were something short of playable. Now Sirius has given it a try and we judge their experiment to be a fair success.

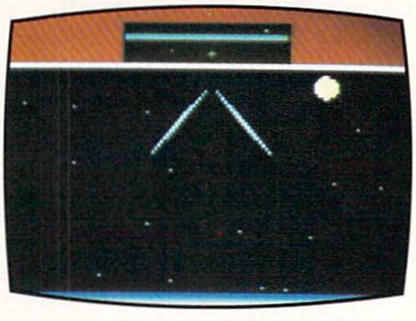
In *Final Orbit,* the player, the captain of the Planetary Patrol, is attempting to defend the earth from the malignant Maladroid forces—aliens bent on reducing earth to so much radioactive slag. In a first person screen (with radar to help), the patrolman lines up the enemy in his or her crosshairs and blasts away. Refueling and protective shield depletion complicates the play.

Despite the fact that the graphics are Atari-VCS-level, despite the familiarity of the game theme and its paleolithic lack of complexity—despite all that I had a pretty good time with *Final Orbit.* Besides, if it wasn't for *Final Orbit,* I wouldn't have had a chance to play *Bumper Bash.*

Bumper Bash is the flip side of *Final Orbit* (and no, you don't have to actually flip the cartridge; you just hit the Commodore key). It's electronic pinball, pure and simple. By simple I mean there are no variations or game generator possibilities (as in *David's Midnight Magic*), no spectacular graphics or sound. Nope. Just an unchanging field, sketchy graphics, and a couple of flippers.

I had a blast with the *Bash.* A





fond remembrance of a misspent youth. I don't expect everyone will feel the same way, or that everyone will want to shell out thirty big ones for retro-programming, but I was thoroughly entertained.

Sirius is not the first computer-game manufacturer to put two or more games on a single cartridge or disk, but they're one of the first to combine two worthwhile efforts. We hope the idea catches fire.

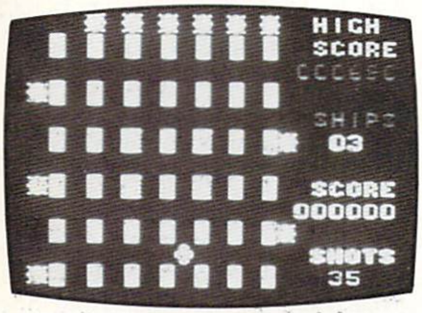
Sirius Software, 10364 Rockingham Drive, Sacramento, CA 95827.

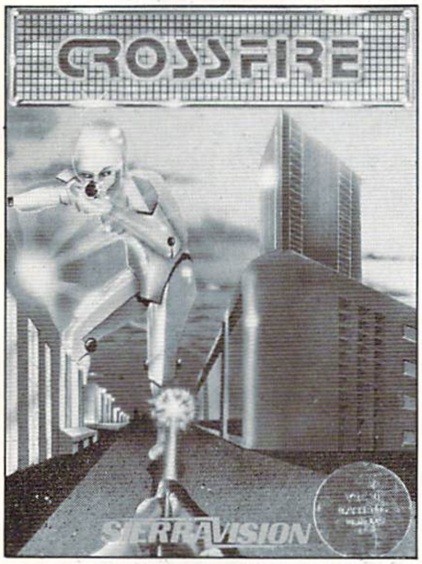
—R.J. Michaels

CROSS FIRE

Sierra On-Line
C-64, VIC-20
Cassette; keyboard

The brain trust at Sierra On-Line (creators of the excellent





Homeword word processor, *Ulysses and the Golden Fleece, Screenwriter, Time Zone* etc. etc.) took a snooze some months ago, and *Crossfire* escaped. That's the only explanation I'll accept.

Your bug/cursor/character sits on a grid. So do a gaggle of vile and repugnantly alien-looking bug/character/thingies. You shoot at them, they shoot at you, let's call the whole thing off.

There are some variations—a limited number of shots which diminishes with each level, a reloading station and a bonus whatzit which you must reach at any cost—but come now; do we really need a bare bones grid shooting game (the VIC graphics are absolutely starved), with no character or atmosphere but with the annoying loop of the old *Peter Gunn* theme?

Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614.

—R.J. Michaels

JUMPMAN JUNIOR

Epyx
C-64
Cartridge; joystick

Run, jump, and climb. Run, jump, and climb. What *Donkey Kong* started, everyone else is trying to finish. But even before Kong and Mario hit the arcades, there were games for home computers built around the run, jump, and climb motif. One of the earliest, from Datasoft, was *Canyon Climber*. Run back and forth across the cliffs. Jump mountain goats, Indian arrows, and rock crevasses. Climb ladder after ladder. For most games of this genre, you can just substitute different nouns in the preceding three sentences to get an accurate description.

Yet, many of these games have their own unique personalities. Even when written descriptions sound similar, games vary in quality of implementation and intensity of play. *Jumpman Junior* is such a game. Run back and forth across the girders. Jump gaps in the structure. Climb ropes and ladders. The description is similar, but the game is different—and it's fun.

The scenario in *Jumpman Junior* is a take-off on Epyx's previous hit game *Jumpman*. In fact, the junior version is nearly identical to the original except that it has only 12 screens rather than the original's 30. Also, *Jumpman Junior* requires you to play the screens in order, starting each new game with screen one. This can be a real pain by the time you have played the first screen 100 times, but still not gotten to the tenth.

The original *Jumpman* allowed you to play the 8 easiest screens, the 10 intermediate screens, the 12 hard screens, all 30 in a row, or all 30 in random order. The graphics style and options in the two games are otherwise identical. Dollar for dollar, if you have a choice between the two (*Jumpman Junior* on 16K cartridge or *Jumpman* on 32K disk or tape), *Jumpman* is the better buy.

In *Jumpman Junior,* you essay the role of the jumpman's apprentice. A jumpman is not a superhero, just a guard/technician with wrist rockets and boot thrusters. Your goal is to save the Jupiter Command Substation (12 screens) by defusing bombs planted by the Alienators. Although you will never see an



Graphics and gameplay mock* Jumpman. *(Atari box shown.)

Alienator, you will be faced with plenty of bombs—from 12 to 16 on each screen or level. Defusing bombs is easy; just touch them.

The real challenge comes in avoiding bullets. Some will travel horizontally or vertically toward you; ones move slowly. But bullets even with you will turn 90 degrees and come at you like, well, a shot. Speeding bullets are especially dangerous on the second screen, where random electrical shocks from the floor and ladders slow you to a crawl.

Various other dangers, besides missing a jump, present themselves. There are the hailstones which bounce left and right, tracking your movement as they fall. And the screen where each bomb is also a booby trap. As you defuse each one, a section of girder or ladder will appear or disappear.

Jumpman Junior allows one to four players to take turns during the game, but they must all share one joystick. Each player can choose the speed at which his jumpman will move. Speed 8 is abysmally slow and Speed 1 is so fast that you'll often run off the end of a girder before you can remember to jump. Allowing different speeds for each of the four players is a nice touch since it allows beginners to compete with more advanced players.

You will typically see a screen drawn in three colors on a black background, but the placement of girders and the game's constant motion keep the display lively. Do not expect to have much time to analyze each screen. You are playing against the clock. Bonus points are reset at each level and count down until you defuse the last bomb. After you lose your four original lives and any bonus lives you have earned (one for every 7500 points), the remaining bombs will explode. Vibrations will rock the substation and you will see girders and ladders crumble and collapse before your eyes.

Even as a novice, you will find *Jumpman Junior* to be fun. Between screens and when you fall, you will be treated to short musical interludes. Falling, in particular, is interesting. When you do not jump far enough, or try to jump down to the next floor, your jumpman will go tumbling toward the bottom of the screen. Every time he hits a girder, you'll hear a noise which sounds disturbingly similar to bones crunching. Finally, at the bottom of the screen, your jumpman will sit with stars spinning around his head. That's what I call game personality.

Epyx, 1043 Kiel Court, Sunnyvale, CA 94089.

—Richard Herring



PURPLE TURTLES

Quicksilva Software
C-64
Tape; joystick or keyboard

Purple Turtles is a fun family game with bright animated graphics and a cheerful musical theme. The gameplay is very simple, and it may be too slow for players who are used to the quick slide-and-shoot arcade-type games; still, younger children will find it entertaining. This was true in our family's case. We both tired of the game rather quickly, but our two children continued to play it enthusiastically for several hours.

The gameplay involves four turtles that lie in wait in a river. They bob up and down while your video image skips from one to the next to get to the other side. Once on the far shore, you must gather several pieces of fallen fruit, and then return. Points are garnered by completing as many round trips as you can in the shortest amount of time.

Players are able to set both the level and speed of the game from 0 to 9, with 9 being the most difficult level. After you have gathered the required number of fruit, you automatically move to a higher level. The first two levels are excellent for children; they should be able to grasp the fundamentals of gameplay here. Unfortunately, in the more difficult levels, the game could become too much for younger kids, yet it is still not quite engaging for older players.

There is a pause function, which is always helpful should the phone ring or somesuch, and a decided lack of violence in the game theme. *Purple Turtles* takes full advantage of its color, graphic and sound capabilities of the 64. While it it not the most engaging we have ever played, the game is fun, and goes a long way toward proving that a disk drive is not essential in computergaming.

—Ben & Jenny Vecchio

BEACH-HEAD
Access Software
C-64
Disk; joystick

Listen up, kid. The allies are counting on you. Your mission is to break the enemy blockade, land your forces, get your tanks inland to Kuhn-Lin and destroy the fortress there. All that's standing in your way are a fleet of ships and their accompanying planes, plus bunkers, enemy tanks, and machine guns. Your forces consist of ten ships and eight tanks.

Nervous? Don't be. This game is a blast.

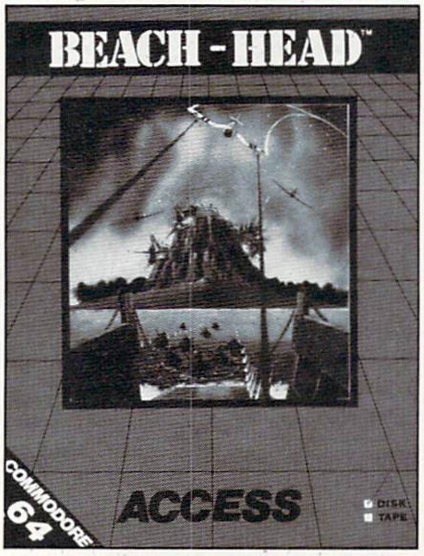
To start the game, you can either attack directly by maneuvering your armada straight for the enemy fleet or you can attempt to navigate your 10 ships through the secret passage. This passage is criss-crossed with torpedoes and mines, but the advantage is that you sneak up on the enemy, catching him unaware.

When the two fleets meet, an air and sea battle ensues. You must shoot down the enemy planes with your ship's artillery before the planes can sink your ships. Each of your ships can only take 20 points worth of damage before it blows up. If you chose the direct route, you have ten ships. Because the enemy knew you were coming, they are ready for you with more planes. If you snuck in, you will probably have fewer than ten ships. But because the enemy was unprepared, you don't have to shoot down quite as many planes.

Once you've disposed of the enemy fighters, you have to sink their fleet. This is done with your big guns, zeroing in on each ship. You have to get them before they get you. The biggest aircraft carrier will try to escape. You score 10,000 points if you sink it.

After destroying the fleet, you must land your tanks on the beach. Because of the size of the harbor, only eight tanks can be landed. These must proceed to the fortress. You control each one individually. Once you reach the fortress, ten correctly placed shots will destroy it.

The graphics in this game are very good. (Special accolade to the planes fading in and fading out.) The combination of overhead view and first-person gameplay ensures that each chapter will present new challenges, new delights. I particularly enjoyed the fading trajectory of my cannon fire in the sea battle. The sound quality is excellent as well. You can pause the game and come back later, or escape whenever you get tired. If you just drop everything, after about a minute the game will start playing against itself. This is a great way to check out the different sections of the program. You can pick up play at any time, so if you wanted to practice getting the tanks to the fortress, for instance, there is a way to do it easily.



The documentation is excellent, including tips for getting a high score. The disk is copy protected, but it does keep a list of top ten scores that can be updated after each game.

Because of the many levels of play, it would take a long time to get boring. There are four levels of difficulty, so as you get better, you can make it tougher on yourself. The game can be played by one or two players.

If you enjoy arcade style games with good graphics and sound, your money won't be wasted on this one. It is a remarkable programming achievement.

Access Software, 925 East 900 South, Salt Lake City, UT 84105.

—Cheryl Peterson

THE SEARCH SERIES
T & F Software
C-64
Tape; keyboard

If you are a serious wordsearch fanatic, then you will be interested in these three games. Each of the tapes is similar in structure to the word search games found in the print medium.

The gameboard is set up with at least 374 letters on the screen. Hidden somewhere within this alphabetic mass are 20 words (there are some 300 words contained on each tape). The gamer has ten minutes in which to find the 20 words. When a word is discovered, the player uses the keyboard to type the word in. If the word is correct, the computer will highlight the word in color. The highest possible score that can be achieved is 200 points.

The three games in this series are *WordSearch, ArcadeSearch,* and *SportSearch;* each of these three games has three separate categories. Thus, the player has more

game possibilities, and 100 wordsearch books.

WordSearch covers capitals, animals, and a general selection of words that everyone should recognize.

Arcadesearch is a little more challenging. This one gives the player the choice of finding titles of home videogames, arcade games, and names of famous videogame characters. It's a true challenge for those who profess to be videogame "experts."

SportSearch covers pro teams, college teams, and general sports knowledge, including soccer, football, tennis, and bowling. The pro and college team games are designed for the sports trivia buff, as they involve more esoteric information.

The fact that the games are time-limited—if you stay in one category for too long the game reverts to the demo mode—lends them an element of suspense that wordsearch books cannot contain. And even though these games are a far cry from a hardcore "computergame," they do offer a pleasant diversion. They are certainly a worthy effort from T & F.

—Jennifer Vecchio

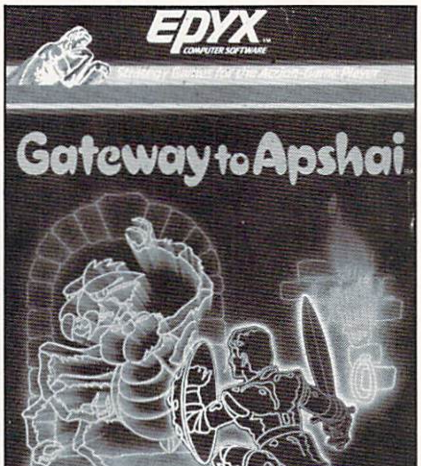
GATEWAY TO APSHAI

Epyx Software
C-64
Cartridge; joystick

If you've ever played Intellivision's *Dungeons & Dragons,* then you've sort of played *Gateway to Apshai.* The concept is identical: you are an intrepid explorer whose sole mission is to find a safe passageway to the fabled lost Temple of Apshai. (This is the sequel to that hit game.) The dimensions of this underworld are awesome; there are eight levels, each containing 16 dungeons. Each dungeon contains approximately 60 rooms. By my abacus that adds up to 7,500 rooms. *Wow,* is right. Don't expect to play this in an hour or so. Give yourself a week.

There are no first person screens; the entire game is presented with an overhead view of the rooms, but a horizontal cutaway view of the characters. It works just fine.

You begin on level one, dungeon one, room one, and have in your possession keys, trap spell, search spell, dagger, and leather armor. You are also given three points in each of these areas: strength, agility, and luck. These nine points determine when your man may die in an attack. Thus, if points are low, avoid any confrontations.



As you travel through any given dungeon, you will only be able to see the room that you are presently in and any room or hall through which you have already traveled. One of the exceptions is that if you lose a life and are revived, all rooms will light up. The various monsters and demons will only appear when you walk into a room, so keep your eyes peeled. Also keep an eye out (or peeled) for traps. These will remain hidden; the only way to spot them is by pressing the F5 key and the fire button.

As you penetrate deeper into the labyrinth, you will find treasures, spells, and weapons. Weapons range from swords and bows and arrows, to chain armor and helmets. Spells will shield you from your enemy, or instill fear in your enemy, or just plain confuse your enemy.

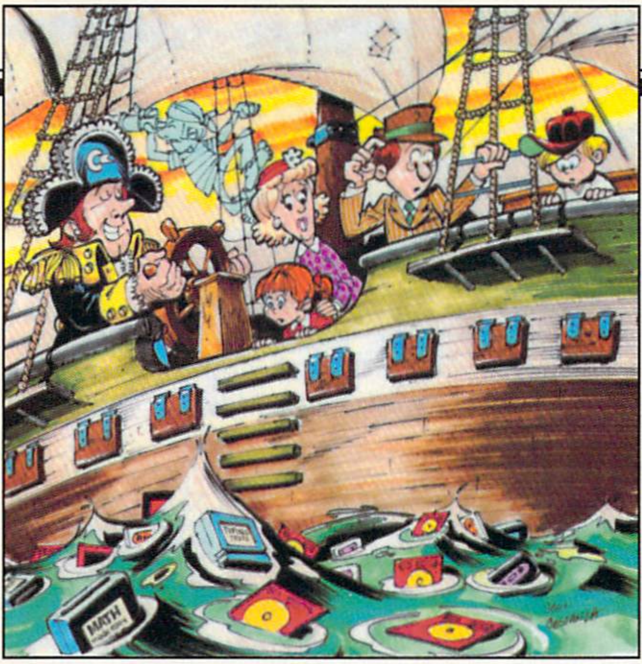
Control of your running figure is accomplished with the joystick. Additional options are called up by three function keys. The F5 key displays your various options (check status, weapons, drop an item, get keys etc.); F3 allows you to actually utilize any of the artifacts you have gathered; and the F7 propels you into the fight mode, with each succeeding tap of the key offering you a single weapon you have at your disposal.

The manual for *Gateway to Apshai* states that this is a one-player game. We disagree. This game is ideal for two people to play in concert, one controlling the hero while the other activates and keeps track of the various functions. Gameplay would thus be accelerated, and the players would have a fighting chance in the higher levels of the game.

In any case, this is a marvelous game, a must for *D & D* freaks. Don't expect lavish graphics or gimmickry and flash; all of the programming has gone into *D & D*-style permutations and the incredible number and variety of rooms and pitfalls.

Epyx, 1043 Kiel Court, Sunnyvale, CA 94089.

—Lenny Nelson
Robert J. Sodaro



Educational Software: a guide for parents

PART II

By Richard Herring

This is the second piece in a six-part series on evaluating educational software. Last month, we looked at why educational programs are so popular in the home, how education and play are rolled together, and where to find information on specific software. This month we'll begin talking about what to look for—and what to look out for.

PERSONAL VALUES & GOALS

Before you go out shopping for educational software, try to define what you want and what you will settle for. You may have a specific goal in mind—such as your child learning to read Japanese. But you may be perfectly happy with any good foreign language package if your purpose is to give your youngster a broader world view. On the other hand, you may simply want a good piece of educational software—any good program. The criteria set out in this series of articles will help you, but before you use them you must make two decisions.

First, how does your educational program at home mesh with the school's program for your child? Many parent's who want to enrich their child's knowledge may prefer programs on subjects which are not emphasized in school. There are some excellent programs which introduce children to music theory, a subject which many schools touch briefly if at all. You can decide what you want your child to learn, but pay attention to those subjects in which he expresses an interest.

If you pick subjects on your own, remember the computer's strengths and decide if they are useful for that subject. Computer programs have a tremendous capacity to interact with the child. In the give and take which occurs, an educational program can be patient and unemotional. It will never be too busy to reinforce a correct answer immediately.

And the child can learn at his own pace. When he gets a wrong answer, he will not have to be afraid of looking dumb to an adult. These strengths of computerized education do not lend themselves to subjects like art appreciation.

Some parents will want to coordinate carefully with the child's existing school program. Ask the teachers what their goals are for the next few months and if your child needs tutoring in any specific areas. If the school has a computer teacher, talk to him too. Find out if he has suggestions for software suited to your child's needs.

Pattern recognition, spelling, and economics are all subjects that the child can explore on your home computer. But if the teacher says your child needs to work on handwriting, gross motor skills, and being more outgoing, educational software is not your answer. A lot of advertising these days hints that our children need to use educational software at home to excel in school. But if your child is really having difficulty in school, what he probably needs most at home is your time. The personal reinforcement and acceptance you can give are far greater than the computer's.

If the school has computers, you need not necessarily use the same software, or even hardware, it uses. What is important are the learning goals you set for your child. Some companies tailor the same program differently for the home and school markets. In the DesignWare spelling games, for in-

stance, the school version uses word lists correlated strictly with the books and grade levels of Silver Burdett (a traditional educational publisher). The home versions of those programs use modified word lists without the full set of words.

The second decision you must make is: what are you willing to accept in educational software? Racism? Sexism? How about pro- or anti-nuclear doctrines? Look at the software carefully to ensure that it fits the personal values you want your child to have. Even very good programs can be subtly sexist. Boys tend to like shoot-'em-ups while girls tend to enjoy less violent programs.

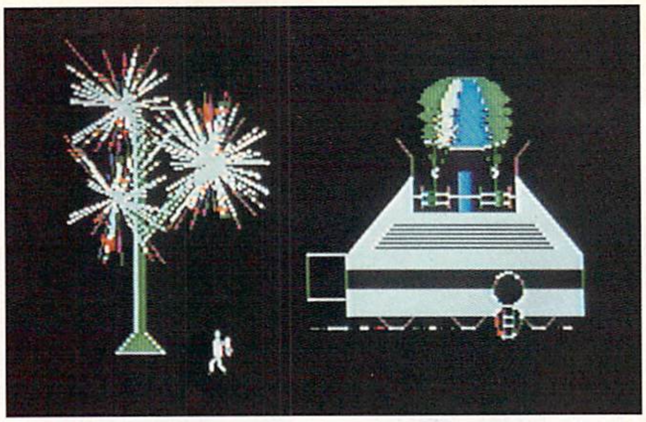
By answering a program's questions correctly, your child might be allowed to fly a spaceship up to another ship, bring an alien on board, transport him back to base, and have him disappear in a flash. Instructions for a boy might read "Capture the alien on his way to destroy earth and return him to the disintegration chamber." But the same game could catch a girl's attention with instructions like "Rescue the alien whose damaged ship is drifting through space and take her to the transporter room so she can get home."

Even a traditional game like hangman may seem violent at times when the press is full of debates over the death penalty. Worse, in computer versions of hangman, a child is likely to focus on the animated graphics display of a body rather than on the word he is trying to spell. Look for the educational purpose of every aspect of a program. Even the reinforcers for the child's correct response should help to teach the subject. Smiley faces are not enough.

In some educational games, the reinforcement is part of the gameplay. *Dungeon of the Algebra Dragons* forces you to search a three-dimensional dungeon for the keys to escape. Whenever you encounter an Algebra Dragon, you must correctly solve the problem he gives you. For correct answers you win gold; for incorrect answers the dragon has you for supper. You will also have to contend with trap doors, spiders, and dwarfs. If you are a parent who objects to *Dungeons and Dragons,* you may not like



Spinnaker's **KinderComp** *consists of six learning games incorporating sound, color, and animation.*



In Search of the Most Amazing Thing *from Spinnaker dispatches young players on a fun-filled quest.*

this type of educational game. But, if you see D&D games as reinforcing other skills, you will appreciate a dragon, or any other critter, which encourages learning.

You can even find an occasional educational game with a female character. *Fay: That Math Woman* uses a woman who is good at math to motivate children to learn. As problems are shown on the screen, Fay taps her foot waiting for an answer. Then she walks to your answer and rides an elevator up one level if you are right or falls through a trap door if you are wrong. Her movements express her joy or her frustration with your answers. This program does cast a women in the traditional teacher's role, but it manages to avoid violence altogether.

ADVERTISING, PACKAGING, AND DOCUMENTATION

Advertising is probably where you will first learn about new educational programs. Generally, a company that is willing to spend money advertising its program thinks it has a winner. Try to determine in which magazines the software is advertised. If they are oriented toward education rather than games, you have a first clue.

Next look at the packaging. Does it provide safe storage for the disk or tape so the program can stay with the instructions? The packaging should clearly identify the educational goals of the program, the age levels at which it is aimed, and any prerequisite skills required of the child. Pictures of actual screen displays should also be shown. If the software has attractive graphics screens, the company will surely not hide them. Is the packaging designed to appeal to a child or to an adult? Remember that you will only pick up the program once when you buy it, but you want your child to return to it often.

Almost all software comes in sealed packages. You would not buy a new word processor, probably not even an arcade game, without having some idea of how it works. Open the package; the documentation is important in making your purchase decision. The writing should be clear and complete.

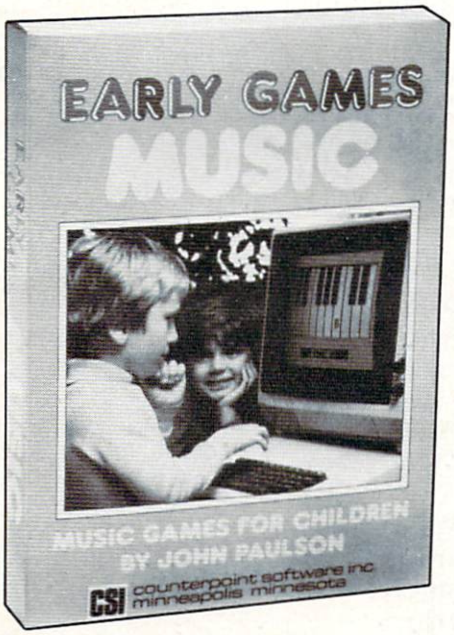
Grammar and spelling must be correct in the documentation just as in the program.

If the program is aimed at children old enough to read, the documentation should be written for them —uncluttered, yet full of examples and pictures. I have seen documentation designed for children who cannot read. By cleverly pairing pictures of screen displays and of highlighted keys on the computer, even young children can figure out what to do.

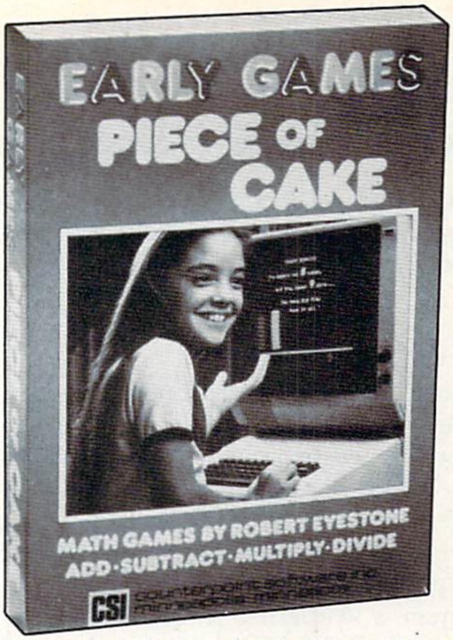
A good example of complete documentation is the 47-page manual that comes with *Word Attack,* a vocabulary-building program. The instructions are good, a complete word list is given, and computer jargon is avoided. This manual is written for the kids who will read it. Other good educational programs may lack essential information in their documentation. *Synthy-64* is a music composition program. Although its manual is written well and is full of examples, it does not make good use of illustrations of actual sheet music notation. Without being able to see bars and music symbols in the documentation or onscreen, novice composers may have difficulty.

If the program requires adult supervision or allows modification, separate documentation should be provided for the adult reader. A child may not begin to read the manual at page one. If he opens it to a section on making object code modifications to the program, he probably will never read more. Ideally, the documentation for educational software will go far beyond instructions on using the program.

In the school version of *The Bank Street Writer,* the documentation is about as complete as you can get. It begins by describing word processors in general before giving an overview of the program. In addition to a flow chart, the program is described



The **Early Games for Young Children** *series lets kids play independently after minimal parental guidance.*



One of the nine offerings in the **Early Games** *series.*

point-by-point. A student guide gives all the information in simplified form. In the question and answer section, solutions are given for any problem which might occur. The manual's last section is a teacher's guide with detailed suggestions.

The opposite of such complete documentation can be found in *Millikan's Experiment,* a simulation of the oil-drop experiment in which the charge on an electron was first measured in 1911. The documentation is a single sheet that gives little relevant information. The program itself begins with several crowded screens of test explaining the experiment, the calculations, and the use of the computer in the simulation. These screens can be bypassed by the child who can then attempt to run the simulation arcade-style without really understanding the principles. This is a good simulation which is highly appropriate on a computer. Few high schools could afford the equipment needed. But the documentation should include all the text from the program and the worksheets for the child.

Documentation should provide a reference source for the child. If the program is a simulation of a historical event, the documentation can provide more background on the time, descriptions of the people involved, and a perspective on how that event influenced life today. Then when the program peaks the child's interest, he will have interesting information right at hand.

If the program can be modified, the manual should explain the process in detail. The documentation for *Word Attack* gives step-by-step instruction on how you can create a custom word list for your child. Other programs make no provision for your changes by the parent or teacher. *Early Games for Young Children* is a set of nine educational activities which, after being explained once or twice, little

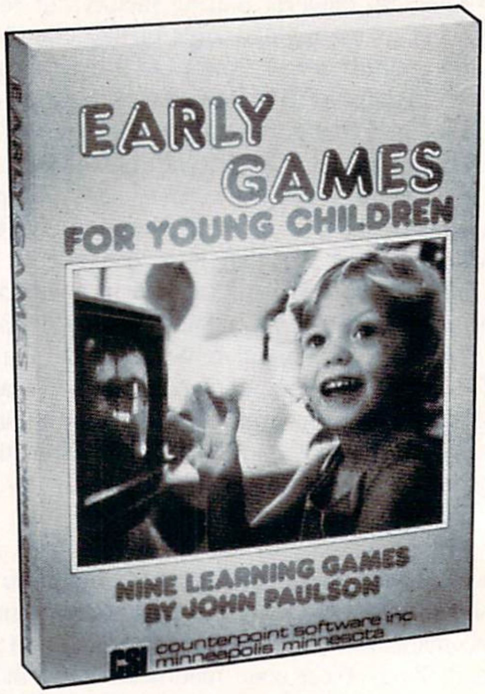
kids can use independently. The program is designed so that parents do not have to help, but it makes no provision for parents who want to change content or speed.

NEXT MONTH

In the next part of this series on selecting educational software, we will consider how programs should handle errors, what warranties companies should offer, and how to evaluate the ease of use of a program. Good and bad points of specific programs will be used to illustrate different criteria. Remember that praise does not mean that everything about the program is wonderful. And criticism of a program on one point does not mean that it is not a good piece of software. Most of the programs mentioned are, in fact, worthwhile purchases if they meet your child's needs.

Programs for Commodore 64 computers mentioned in this article:

The Bank Street Writer Scholastic, Inc. 730 Broadway New York, NY 10003	$95 for three disks and documentation described in article
—or—	
Broderbund Software 1938 Fourth Street San Rafael, CA 94901 (415) 479-1170	$69.95 for two disks and very different manual without teacher's guide
Dungeon of the Algebra Dragons Timeworks, Inc. P.O. Box 321 Deerfield, IL 60015 (312) 291-9200	$24.95 for ages 14 and up
Early Games for Young Children Counterpoint Software Suite 140 Shelard Plaza North Minneapolis, MN 55426 (800) 328-1223 or (612) 926-7888	$29.95, for pre-kindergarten to first grade
Fay: That Math Woman Didatech Software 2301-1150 Jervis Street Vancouver, B.C. Canada V6E 2CB (604) 687-3468	$29.95, for grades one to four



This Early Games entry consists of nine different activities including drawing, comparing, and counting.

Millikan's Experiment Merlan Scientific, Ltd. 247 Armstrong Avenue Georgetown, Ontario Canada L76 4X6	$99 for disk with four other programs, $26 on cassette, for grades ten and up
Synthy-64 Abacus Software P.O. Box 7211 Grand Rapids, MI 49510 (616) 241-5510	$29.95 on tape, $32.95 on disk
Word Attack Davidson & Associates 6069 Groveoak Place, # 12 Rancho Palos Verdes, CA 90274 (213) 378-7826	$49.95, for grades four to twelve
DesignWare 185 Berry Street San Francisco, CA 94107 (800) 572-7767 (415) 546-1866 in CA	

Continued from page 64

SKY BLAZER
Broderbund Software
VIC-20
Cartridge; joystick

Any horizontal streak-and-shoot game is going to bear a superficial resemblance to *Defender.* The format is *that* limited.

Sky Blazer contains five missions for the player: 1) Destroy the Radar, 2) Waste the Tank, 3) Bomb the ICBM, 4) Demolish the Tank—this one shoots heat-seeking missiles, and 5) Wipe out the Bungeling Headquarters. Once each mission has been completed, the player advances to the next level. During each of these missions there is a friendly plane that will fly by and drop off supplies for you via parachute.



On the first level the sky is clear, save for your Blazer and the refueling plane. On subsequent levels, there will be attack planes, or an enemy helicopter that drops off balloon bombs. Also, if you should not attend to the fuel drop immediately, a bird will fly by and scoop up your supplies (reminiscent of the hungry clam in Broderbund's *Sea Fox*). You will have to sneak up on the tank when you get to that level, as it is able to travel faster than you. In addition to dropping bombs your Sky Blazer is also capable of forward firing. When you are close to the ground and push the fire button, you will drop bombs, otherwise you will be shooting your air-to-air guns.

Precise coordination is required to paste the tank, especially with the attack drones winging towards you. Still, your plane is capable of hovering for brief moments, but you have to be quick here too, for the scenery is constantly scrolling by, and you must drop your payload and move on if you intend to get any points.

Streak-and-shoot fans will enjoy this game. (I am, and I did.) At the same time, I must admit that the action is familiar, the graphics so-so (except for a spectacular starfield that has nothing to do with the action), the controls a bit sluggish. . .but otherwise, hey, have a party.

Broderbund Software, 17 Paul Drive, San Rafael, CA 94903.

—R.J. Michaels

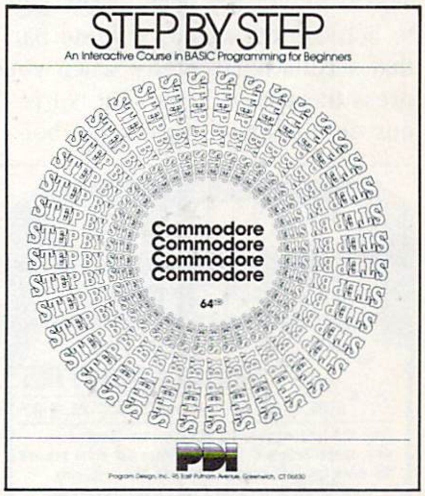
STEP BY STEP
Program Design Inc.
C-64
Disk; keyboard

The subtitle of *Step by Step* is "An interactive course in BASIC programming for beginners." That pretty much tells the story. Though not as elaborate as the multiple-disk programming tutorials from Timeworks and others, *Step by Step* succeeds in its modest—but not simple—ambition. I enjoyed the course and benefitted from it, and no one flees from math and languages faster than me.

The course is divided into ten lessons, many of which are subdivided yet again. At the end of most segments is a quiz. Within the lessons are "spot quizzes," questions interspersed with information to reinforce what you have learned or to provide tangential information.

With the disk comes a workbook. The student programmer will constantly refer from screen to book as the book contains questions and clarifications of the onscreen lesson. This provides a welcome relief for the eyes and is not bothersome, as some screen-to documentation activities can be.

The information is presented logically, each lesson building on the previous one. The interactive



character *Step by Step* consists of its calling you by name, praising you for correct answers and prompting you politely after wrong ones. The course was fairly easy for me until about lesson five, at which time I started gazing longingly at my baseball glove and *Beach-Head* game disk. I suggest you take the course with a friend to help each other through the difficult segments; the only alternative is a prune-faced magistrate who'll pull you by the ear back to the computer.

A well considered, well executed program.

Program Design, Inc., 95 East

Putnam Ave., Greenwich, CT 06830

—Dan Hallassey

CUT & PASTE

Electronic Arts
C-64
Disk

You can't simply boot the program and start typing away on a blank screen with this $49.95 word processor. This is due to the program's nonstandard method of entering and filing text. After *Cut & Paste* loads, you're prompted to insert the "document disk" that accompanies the program disk. Then a special file called "Blank" has to be loaded. To do so, hit the back arrow key to activate the menu, a white bar that scrolls horizontally when you press the cursor keys. The various options move across the bottom of the screen like a news bulletin on your TV during an episode of *The A-Team.*

The main menu includes: save, print, catalog, cut, paste, indent, unindent, and buffer. When "catalog" is reverse-highlighted, hit return and you'll see the preset file called "Blank." Cursor keys are used to highlight "Blank" before reentering the menu and loading the file. Now you may key in your text and SAVE the file under a new name. Other disks can be formatted from within the program, which automatically writes the "Blank" file to the new disk while it does the formatting. It's an odd way to go about things, but it works.

The cut and paste operations from which the program derives its name are a good example of how text blocks are manipulated. Move the cursor to the first letter in the section you want to move, then press CTRL-A and the cursor keys to highlight the desired text. Hit the back arrow key to escape to the menu, then activate "cut." This transfers the highlighted text into the buffer, a temporary storage space in the program's memory. Position the cursor at the text's destination, then enter the menu and activate the "paste" option, which slaps down the text stored in the buffer. (The buffer's contents aren't affected by the disk operations, so you can cut text from a letter on one disk and paste it into a memo that's on a different disk.) To delete blocks of copy, just cut it out and don't paste it back in. The last text entered into the buffer remains there, and this can be a lifesaver if you delete a paragraph and then change your mind.

This technique is employed to strike over existing words within a highlighted block. But the entire block flashes on and off like a strobe light each time you type over a character — great if you want to trigger some cheap '60s flashbacks, but not too conducive for writing.

Inserting text into a document requires you to do nothing but cursor to the location and start typing. Everything slides over a space to the right each time you hit a key. Scrolling forward one screen is executed with a CTRL-F backwards with a CTRL-B; other than the ability to hop directly to the beginning and end of a file, this is all you get in the way of moving quickly around a file.

Indenting blocks of copy is accomplished by selecting IND from the menu. Each time this option is activated, the left margin moves five spaces to the right. Most operations can be executed without resorting to the menu. CTRL-C does cut, CTRL-P takes care of paste. Paragraphs are indented with a CTRL-T. This is convenient once you're familiar with the way the various features work and how to use them in your writing.

After cataloging (reading contents of) a disk, a different menu lists other options, such as load, rename, copy disk, disk 2, quit, print, delete (file), and document (for returning to edit a document). One of these, "copy disk," is unavailable on any other C-64 word processor. It will copy the entire contents of a disk of files onto a blank one, great for making backups.

You won't have to worry about memorizing a series of abbreviated commands to set spacing and margins. Selecting "print" brings up a sub-menu from which you pick one of three print formats. Margins and other settings are measured in inches, not number of spaces, and are all adjustable; they can be saved to

disk so you don't have to reset them each time a standard print format is required. Because format commands aren't embedded in the text, the screen won't be cluttered with dozens of format commands and control codes that make the display harder to read. (White characters on a rich blue background—a color scheme that cannot be altered—and automatic word-wrap also contribute a legible display.

But you also won't be able to change settings in the middle of a document. Once you have selected double-spacing you can't switch to single for a paragraph or two. The same goes for top, bottom, and side margins, as well as headings and automatic page numbering. Also, you cannot print to screen for a preview of the document. If your work involves extensive tabulation, you'll probably chew up plenty of paper trying to get a 40-column display to look right when it's printed 80 columns wide on paper.

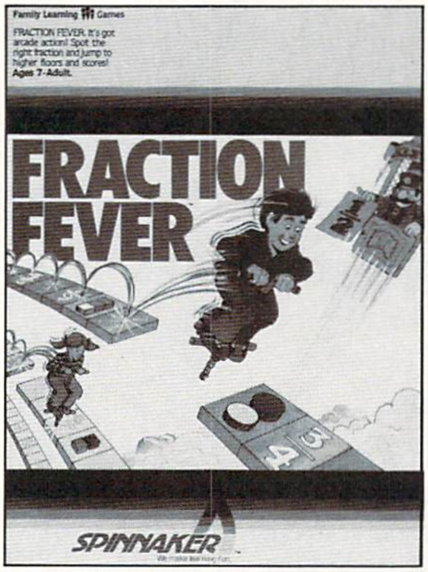
The 13-page manual is disorganized and confusing. A concise reference card makes up for this somewhat — the program's so limited that even total novices can master the system overnight by simply by playing around with it and keeping the reference card at hand. The key advantage of *Cut & Paste* is that it's effortless to learn and use. But the main reason it's easy to learn is that so many features usually found in a word processor are missing, so you don't have to learn them at all.

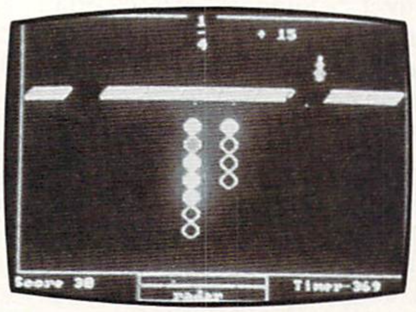
Admittedly, anyone who's concerned with composing letters, memos, shopping lists, and other simple documents may not need to center lines, underline text, or search and replace words and phrases. In fact, *Cut & Paste* may fulfill the needs of many home users—but students and anyone else with more than casual word processing requirements should look elsewhere

(Note: start with our word processor feature in the June *Ahoy!*)

Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403

—Shay Addams





FRACTION FEVER
Spinnaker Software
C-64
Cartridge; joystick

Other than the Chinese water torture, I'm hard pressed to think of a more frustrating or annoying experience for children than trying to play Spinnaker's *Fraction Fever.* Just ask my kids!

Mind you, the concept is good. The program's stated purpose is to "help develop an understanding of what a fraction is, of relationships between different fractions, and of the relationship between numerical and visual representations of fractions." Blah, blah, blah, but who can argue the value of that? Well, unfortunately, somewhere between the original idea and its implementation, something got factored out.

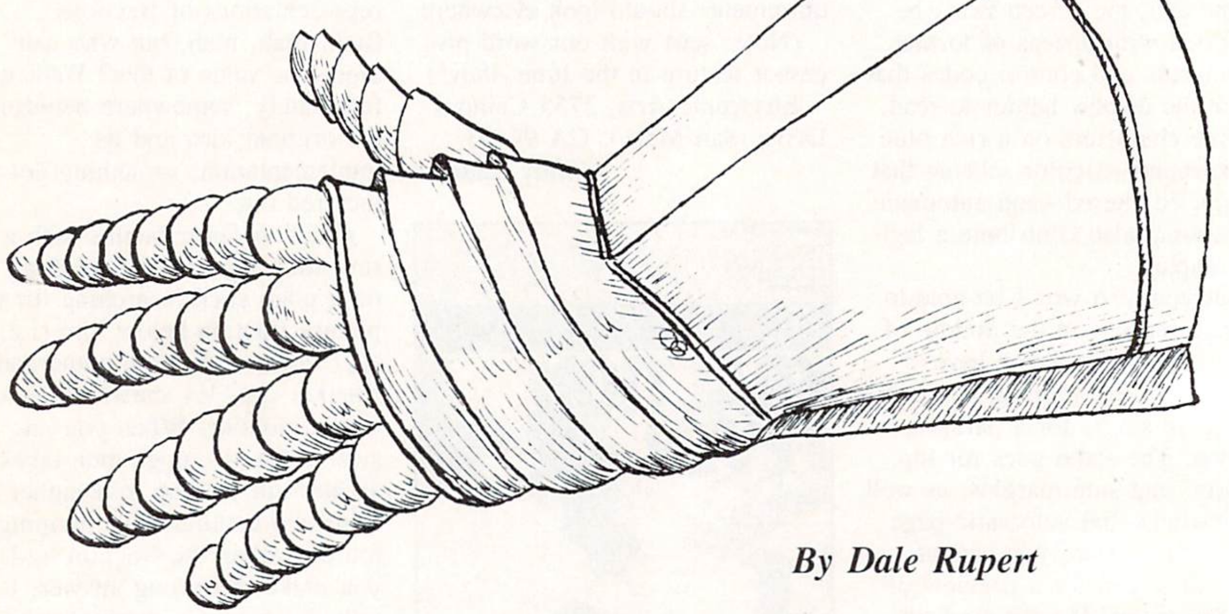
Fraction Fever begins with a tiny stick figure hopping along on a pogo stick, searching for the picture fraction below him (i.e. ▄▄) that matches the numerical fraction (i.e. ½) shown at the top of the monitor. When you answer correctly, pogo-man takes an elevator ride up to a higher floor and continues his jumping journey along the fraction trail. If you make the wrong answer, he falls down to the basement and you have to start the game again.

Sounds like fun? Believe me, it's not! The picture fractions are tiny and blurred, virtually impossible to decipher. (Glasses anyone? Bring on von Leeuwenhoek!) Moreover, the numerical fractions at the top of the screen are positioned virtually half off the monitor. Plus, the man/creature on the pogo stick bounces along at such a frenetic pace that it's almost impossible to react and hit the joystick when the correct fractions match. To make matters even worse, this whole scenario is set to a very annoying musical (and I use that term advisedly) background reminiscent of the melodic suspense buildup on television's "$64,000 Question." And it gets to you about one minute into the game!

I suggest a quick "back to the drawing board" for *Fraction Fever.* Truly, there's got to be a better way to learn and identify fractions.

—Valerie Tamis

COMMODARES



By Dale Rupert

Each month, we'll present several programs designed to toggle the bits in your cerebral random access memory. We invite you to send your solutions to *Commodares,* c/o Ahoy!, 45 West 34th Street — Suite 407, New York, NY 10001. We'll print the cleverest, simplest, shortest, or most unusual solutions. Your original programming problems would be equally welcome!

PROBLEM #4-1: SQUARED SUM

Let the computer find as many numbers as possible which are equal to the square of the sum of their digits. For example, 23 is *not* a solution since the square of the sum of its digits is (2+3) times (2+3) or 25. And 25 does not equal 23.

PROBLEM #4-2: SUM OF CUBES

Find as many numbers as possible which are equal to the sum of the cubes of their digits. Once again 23 is *not* a solution since 2X2X2 + 3X3X3 does not equal 23.

A hint on both of these problems: the digits of the numbers are easily attainable with the MID$ function if the numbers are first converted into strings.

PROBLEM #4-3: WRONG NUMBER

What's wrong with this program? How would you fix it?

```
10 REM FIND A LETTER'S POSITION I
N THE ALPHABET
20 INPUT "WHAT LETTER";L$
30 PRINT L$ " IS LETTER NUMBER" A
SC(L$)-ASC("A") "IN THE ALPHABET"
```

PROBLEM #4-4: RANDOM REPITITION

The computer fills the screen with random integers from 0 to 9. Whenever one number equals its immediate predecessor, both numbers are printed in reverse video. All others are printed normally. For example, in the sequence 0 5 5 4 9 9 9 1, the two fives and the three nines are printed in reverse video.

The number of letters and solutions to the Commodares problems posed in the January issue is very gratifying! There is a great amount of fine programming being done by our readers.

We are still receiving solutions to the *Square Name* and *Crossed Name* puzzles from issue #1. Alan Bowen (Franklin, Tennessee), Ronald Wilson ("The Commodore Caper" from Lucedale, MS), Gary Schueller (Alta Loma, CA), and Denis Cyr (Elliot Lake, Ontario, Canada) all submitted working programs for both problems.

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BOOK REVIEWS

Continued from page 40

THE COMMODORE 64 MUSIC BOOK: A GUIDE TO PROGRAMMING AND SOUND By James Vogel and Nevin B. Scrimshaw

Have you longed to make beautiful music with your Commodore 64's SID (sound interface device) chip? Have you despaired of disentangling the complexities of programming that chip? If so, *The Commodore 64 Music Book* (Birkhauser Boston, 1983) is what you've been waiting for. This short volume takes all the parameters of sound apart. It explains them clearly and simply so you can understand what they're about. Best of all, it provides short, easy-to-read programs that let you *hear* the differences in such variables as waveform and pitch.

The book doesn't make programming sound easy, but it makes it understandable. You need some programming experience to use it. It will teach you some basics about the physics of sound and how to manipulate the characteristics of sound effectively.

The first section surveys individual properties of music such as pitch, frequency, and waveform in separate chapters that run a few pages each. The mysteries of ADSR (Attack/Decay/Sustain/Release), the "envelope generator," are unraveled so that even the non-scientific can grasp them. Each quality is illustrated with a program short enough to encourage you to key it in just to hear what the authors are talking about.

If this sounds intimidating, it is not. Each concept is comfortably clear. When you come to the second section, which shows how to program the SID for each of these characteristics, learning how to set which bits in the control registers seems very worthwhile. Each characteristic—pitch waveform, ADSR, volume, and note duration—is treated separately. The authors provide a detailed SID chip control chart. POKE is the workhorse for programs in this section.

Section three gets down to the business of making music. Programs use READ and DATA to add musical notes to manipulate within the sound framework. You are introduced to single and multiple voice programming. The example programs in this section are longer, and each program is fully annotated.

After music comes sound effects, to put pizzazz into games and other programs. You can explore white noise and creating effects with random numbers. The authors show how to fill arrays with note values for more flexible data manipulation. They touch on playing with voices and creating different musical "characters" (instruments) with the same notes.

The book doesn't cover any individual subject in depth, but if you read it with your fingers on the keyboard (as the authors intend), you will have a good basis for exploring the C-64's musical potential. Anyone who wants to get next to the C-64's powerful synthesizer can profit from this book. If you are musical, you can use it to turn on a whole new musical instrument.

—Annette Hinshaw



THE NOBLE LIE

Continued from page 56

point 6 places to the right" or "mulitply by ten to the sixth power." Likewise, "E−5" means "move the decimal point 5 places to the left."

Now to represent the number of seconds in a year (approximately ten pi million!) we may write 3.14E7 or 31.4E6 or 0.314E8, all of which equal 31,400,000. The diameter of a Hydrogen atom is roughly 1E−10 (or 0.000 000 000 1) meter.

Numbers as large as 1.70141183E+38 and as small as 2.93873588E−39 are all stored in five bytes of memory. This is not even the range of an inexpensive scientific calculator (usually 1E99 to 1E−99), but it is not overly limiting. Floating point notation allows storing a wide range of values without wasting a lot of memory for place-holding zeroes.

Unless we specify otherwise, numerical variables in BASIC are assumed to represent floating point values. A percent sign after the variable name implies it is an integer variable such as X% or A2%. These variables are limited to the range 32767 through−32768. They must be whole numbers—decimals are not allowed. An advantage of using integers is that they are stored in only two bytes of memory. Also, calculations are typically performed faster on integers than on floating point numbers.

SLOW INTEGERS

That last statement is simply not true for the Commodore 64 however! Try this simple benchmark program:

```
10 REM - BENCHMARK
20 TI$ = "000000"
30 Y = 30
40 FOR I = 1 TO 1000
50 X= Y * Y
60 NEXT
70 PRINT TI
```

Line 20 resets the internal timer. Lines 40 thru 60 perform 1000 multiplications. Then line 70 prints the number of "jiffies" (sixtieths of a second) that the program required. Line 50 performs a floating point multiplication and assigns the result to a floating point variable. My result was 323 jiffies. (It varies with the number of spaces typed into line 50.)

Change lines 30 and 50 as follows:

```
30 Y% =30
50 X% =Y% * Y%
```

Now it takes 381 jiffies. Contrary to every other computer I have tried this type of benchmark on, the Commodore performs floating point operations faster than it does integer operations. You might continue this investigation to see if the benchmark program is showing an anomaly, or if that's really the way the C-64 works. Let me know if you come up with any interesting conclusions.

If you are interested in delving further into the storage of numbers in BASIC, try this simple program to get started:

```
1 INPUT A
2 P = PEEK(45) + 256*PEEK(46)
3 FOR I = 0 TO 6
4 PRINT PEEK(P+I);
5 NEXT I
6 PRINT : GOTO1
```

According to page 312 of the *Commodore 64 Programmer's Reference Guide*, there is a pointer at decimal locations 45 and 46 called VARTAB which points to the start of BASIC variables. A pointer is a two byte quantity. Its numerical value is equal to the sum of the first byte plus 256 times the value of the second byte. The pointer indicates an address in RAM.

Line 2 above calculates the value of the pointer. Line 1 allows you to type in a value for the variable A. Lines 3 thru 5 print out the contents of RAM starting at the pointer. If you run the program and type 1 for the value of A, the results are

```
65 0 129 0 0 0 0
```

The 65 and the first 0 refer to the name of the first variable referenced in the program. The ASCII value for "A' is 65. The 0 shows that the variable name is only a single letter. The remaining numbers show how the number 1 is stored in memory.

Enter other values for the variable A and see how they are stored. If you input values in an organized manner, you will see patterns in the output. To decode what you see, you must think in binary. It is a pretty difficult puzzle to solve. To get clues, try using whole numbers and decimal values that are multiples of 2 or ½, such as 2,4,8,1.5,1.25. Also consider negative numbers.

We really don't need to know how numbers are stored within the computer. But is is important to realize that a limited amount of storage is allowed for each number. Consequently, there is a chance of uncertainty and error in our calculations.

Now that we can peek into memory and see how values are stored, let's see if we can solve the dilemma of 5 not equalling the square root of 25. Change lines 1 and 3 of the program above to the following:

```
1 AA=5 : BB=SQR(25)
3 FOR I=0 TO 13
```

Also delete line 6. When you run it, the result is

```
65 65  131  32  0  0  0  66  66
131  32  0  0  1.
```

The 65 65 represents the variable name AA. So the number 5 is stored as 131 32 0 0 0. The 66 66 represents the variable name BB. The number equal to the square root of 5 is stored as 131 32 0 0 1. Now it is obvious that as far as the computer is concerned, five is *not* the same as the square root of 25. So why are both values displayed on the screen as "5"? The answer to that is found in the *Programmer's Reference Guide* on pages 5 and 6. It says that calculations are performed to ten places of accuracy, but the results are rounded to nine digits before printing.

Can you determine the smallest stored difference which results in a printed difference? Try poking values other than 0 into P+6 after running the program above, then print the value of AA. In the direct mode, just type: POKE P+6,1: PRINT AA. Now POKE a 2 instead of the 1 into location P + 6. Can you explain the results?

I hope you have gained some insight into the mathematical workings of the computer. There are many more aspects of computation yet to look at. Just keep in mind the limitations of the computer if you are using it to perform important calculations. To the best of its abilities the computer doesn't lie. It is up to you to know the extent of those abilities.

LUNAR LANDER

Continued from page 35

lander with a large flame. Flickering of the flame is accomplished by switching back and forth between different size flames, or between a flame and no flame.

A small machine language subroutine is used to move the sprites around in memory, but it could be used for other purposes. The actual subroutine is a block move; it moves from 1 to 256 bytes from any source address to any destination address in memory.

The routine is 14 bytes long, and located at line 2390. To use it, first poke it into protected memory somewhere (for example, the cassette buffer), and then call it with a SYS command. The source address, destination address, and number of bytes to move can be changed by changing the appropriate DATA values according to this table:

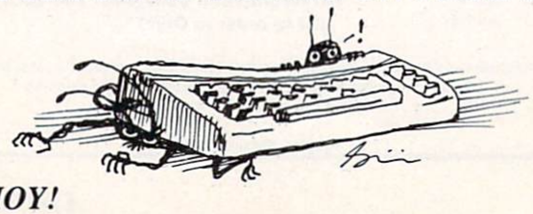
	relative byte(s)	my value(s)
source	4 and 5	8,158
destination	7 and 8	64,3
byte count	11	63

Notice that the source and destination are two numbers—it takes two bytes to store an address. The address is given with the high byte first, then the low byte, and can be calculated by this formula: high byte=INT(addrs/2556), low byte=addrs-high byte X 256.

Another use for the block move subroutine is to fill memory locations. For example, to clear the first 255 bytes of the screen, you set the destination address to 1025, the source address to 1024, and the byte count to 255. Now poke 1024 with 32 and call the block move subroutine. The routine will copy the value from 1024 to 1025, then from 1025 to 1026, etc., filling 255 bytes in this manner.

Finally, in the *Lunar Lander* program, you can change gravity to any value you want by changing GR in lines 715-730. Good luck and have fun! □

SEE PROGRAM LISTING ON PAGE 83



WHO PROGRAMMED J.R.

Continued from page 50

You must, therefore, avoid J.R. at all costs: first, because he will want to stop Sue Ellen from obtaining this independence, and second, because he will most assuredly feel that the map is rightfully his. J.R. will use any means to stop you!

"Sue Ellen goes on to say that you will be paid handsomely for your services and, if you find the map and return it safely to her, Sue Ellen will pay you a bonus of two million dollars.

"Unbeknownst to you and Sue Ellen, J.R. listens to your conversation while lurking in the hallway outside the living room doors.

"You must leave at once. She gives you the snapshot, the ring, and $500,000 for expenses. She leaves you there and proceeds upstairs to her room."

According to Garon, the game has recently been sent out for play-testing, and no one has solved it yet. He can solve it in about 100 moves, but estimates that if the average person played for a few hours each night, finishing the game would take a couple of weeks "at the very least."

Which is really nothing to complain about. The good guys on the show have been trying to beat J.R. for years. □

EASY SCRIPT

Continued from page 17

output format. The latter is controlled entirely by a very complete set of embedded format commands. These include control of headers, footers, separate margins for headers, footers and text, page length, centering, top and bottom margins, forced paging, single, double, and triple line spacing, left and right justification and automatic page numbering. About the only feature lacking is the ability to do footnotes. (Note the distinction between footers and footnotes.) Printing widths of up to 240 columns are supported. Remember that the width of the output text is not the same as the width of the displayed text. Format commands are all preceded by hitting the f3 function key which displays as a re-

verse asterisk on the screen. Format symbols and commands will not print out on the final document.

Text editing is extremely simple. The full screen editor supports the INST/DEL key as well as vertical scrolling. Other features include line and character insert modes, text ranging for block movement, duplication and deletion, search with and without replace as well as rapid cursor movement. Both standard tabs and decimal tabs are supported.

Extensive disk handling includes formatting of disks, erasing and renaming of files, loading, listing and displaying of the directory without erasing text as well as file loading from a directory display. Files may be loaded and appended or inserted into an existing body of text. Disk housekeeping is handled from Disk Mode by hitting the f4 function key. This mode can be entered at any time without affecting text in memory. Using the "$" key without preceding it with the "+" key will display the directory, without erasing any text, from disk mode.

Linked files allow printing of text which may exceed the 764 line by 40 column capacity of available memory. Fill file capability allows personalized form letters and interfacing with mailing lists.



Easy Script, ***as the name implies, is a word processor that's easy to use. If you've worked with a word processor before, expect to be entering text within 15 minutes of booting the program. However, mastery of*** **Easy Script** ***will take some time.***



Easy Spell ***is a fully functional spelling checker that must be used in conjunction with*** **Easy Script.** ***It is loaded by*** **Easy Script** ***in the same manner as a text file. Control is transferred to*** **Easy Spell** ***when loading is complete.***

There is even a simple procedure to include a BASIC program listing as part of the text.

What may be the most outstanding feature of *Easy Script* is the ability to output text to the screen as well as the printer. This allows text to be previewed on the screen exactly as it would appear on paper. The screen acts as a window on the text page on this mode. Selected page printing is possible by switching from view mode to printer mode and back again at page breaks. Unfortunately there is no convenient way to edit text while proofreading when using the output to screen feature. The view mode can be exited by hitting the RUN/STOP key to return to the last cursor position in edit mode. Reentering view mode, after corrections are made, returns to output at the beginning of the document. The entire text must be scrolled through again to see the effects of any changes. There is no way to enter view mode at a particular position in the text.

Easy Script is presently supplied on disk, although the manual continuously refers to a cartridge format. It is possible that future versions will be supplied on cartridge form.

Easy Spell is a full functional spelling checker that is designed to be used in conjunction with *Easy Script* but is sold separately. In actuality the program cannot be used on its own, but must be loaded by *Easy Script.* Oddly enough, the packaging used by Commodore seems to imply the presence of a spelling program for classroom use rather than an excellent adjunct for a word processor. As with its parent program, *Easy Spell* was written by Simon Tranmer. A retail selling price frequently under $20 makes it a bargain as well. Included in the package is an excellent 30-page manual with the expected tutorial and reference sections, although the former is hardly necessary in this case. The package is supplied with two disks, a copy-protected program disk, and a 20,000-word dictionary disk. The manual indicates the availability of an optional 32,000-word dictionary, a British version of the dictionaries and a blank dictionary disk. The latter is designed as an educational aid where the student "teaches" *Easy Spell* all of its words.

Easy Spell is loaded by *Easy Script* in the same fashion as a text file. Control is transferred to *Easy Spell* when loading is complete and back to *Easy Script* when you are through with *Easy Spell.* Thus it is fully interactive with *Easy Script.*

In use, the program scans a text file. A report is generated and displayed containing statistics on the total number of words, the number of unique

words, the average word length, the number of sentences, and the number of paragraphs. An optional word frequency report is available as well. All reports can be listed to the screen or the printer. Following the initial scan the dictionary disk is inserted and all unrecognized words are listed to the screen. The text disk is then placed back in the drive and actual corrections are performed on the full text display, although permissable changes are restricted to the unrecognized words. The user has the option to correct a word, skip a word, memorize a word so that further occurrences of the word will not be flagged, or save the word in the user dictionary. The latter serves as a means of customizing *Easy Spell* for specialized applications allowing the recognition of technical words, buzzwords, proper nouns, etc. Different user dictionaries may be saved on different copies of the dictionary disk for a variety of applications. When all words have been checked, the text file is updated and saved to disk. The total process, aside from the user checking each word, takes under five minutes for an average file.

The manual contains one significant error with regard to selecting a file for checking. The instructions indicate that the function keys f1 and f3 may be used to select a file for editing. The user is then referred to section 9.4.2 of the *Easy Script* manual for more specific instructions. This is apparently a feature that is no longer implemented in *Easy Script,* as the referenced section makes no mention regarding the use of these keys for this application. A brief experiment cleared up the mystery. The f1 key scans through the disk directory in the forward direction and the f3 key scans in the reverse direction.

It is with some regret that we must report on what appears to be a significant bug in the *Easy Spell* program. The bug seems to occur when characters are added to a word during the correction process. As the text is pushed down to make room for the inserted characters, the start of the next paragraph is overwritten by the end of the paragraph which contains the word being edited. This seems to happen only when the last screen line of a paragraph does not have enough blank spaces to accomodate the inserted characters. To make matters worse, the error propagates through the remainder of the text.

Under the circumstances, you may want to hold off purchasing *Easy Spell* till this problem has been resolved. On the other hand, the program's low cost and other useful features may make it a worthwhile investment regardless.

I would like to thank Mr. Peter Reynolds, member of ICPUG, for supplying the historical information in the May 1982 issue of the ICPUG newsletter. □

PRINTER INTERFACING

Continued from page 25

$119.95 Tymac Connection is the optimum selection. In addition to its better graphics performance, it has a number of other useful features mentioned above. The 2 kilobyte buffer will also give an extra minute of computing time.

For letter quality printers, where graphics are of no use, the $49.95 Card?/B is the best buy. It features a new compact construction with all the works in a small extension to the Centronics printer connector.

All the tests for this report were done using a single printer. The results with other printers may differ. If at all possible, get a demonstration of the particular printer/interface combination you will be using before you buy.

ACKNOWLEDGEMENTS

I would like to thank the following for their assistance in this project:

Star Micronics Inc., Division of Star Mfg. Co., Ltd., P.O. Box 612186, Dallas Fort-Worth Airport, Texas 75261 (for the use of a Gemini 10X printer).

Micro-Ware Distributing., 1342-B Route 23, Butler, New Jersey 07405 (for providing the Tymac Connection).

Cardco, Inc., 313 Mathewson, Wichita, Kansas 67214 (for providing the Card?/+G and their able assistance).

Tymac Inc., 127 Main Street, Franklin, N.J. 07416

NAME THAT STAR

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1st Line	Jumbled name, correct name (Don't forget the comma)

2nd Line	Clue not larger than 18 characters
3rd Line	Clue not larger than 18 characters
4th Line	Clue not larger than 18 characters
5th Line	Clue not larger than 18 characters

The 5th Line must end with a comma and zero to signify the end of the information pertaining to that particular name.

As you've probably guessed, there's little point to punching the game in and playing it yourself immediately afterward. Unless your memory is pathetically short, you'll remember many of the answers. That's why I recommend punching the program in with the object of amusing friends at your next social gathering. If you're determined to personally reap the benefits of your keypunching labors, let the disk sit on the shelf for however many days or weeks it takes for your memory to dissipate. If that seems too long to wait, remember — you don't eat a good fruitcake until months after you bake it.

A brief description of the program flow:

Line 1-4	Remark statements for Name and Author
Line 60-90	Player name entry
Line 100	1st branches to store emcee positions in strings 2nd to draw the main screen
Line 110	Positions emcee on stage
Line 120	Subroutine to erase previous dialogue
Line 130	Delay loop and positions the cursor
Line 140	Subroutine to read dialogue
Line 180	400 Game Instructions
Line 410	Reads unused opening dialogue if instructions are refused
Line 420-555	Main loop reads mystery name data and keeps score
Line 560-720	Wrong answer subroutine
Line 750-830	Closing dialogue

SEE PAGE 86

THE LIGHT FANTASTIC

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Addresses of companies mentioned which make computer/laserdisc interfaces or systems:

Company	System
New Media Graphics 139 Main Street Cambridge, MA 02142 (617) 547-4344	Atari 400, 800 and XL-series
Aurora Systems Inc. 2040 East Washington Avenue Madison, WI 53704 (608) 249-5879	Apple II
Allen Communication 3004 Arapahoe Avenue Boulder, CO 80303 (303) 449-2971	Apple II
Positron 30 Lincoln Plaza Suite 3S New York, NY 10023 (212) 586-1666	Complete systems
Wicat Systems 1875 South State Street P.O. Box 539 Orem, UT 84057 (801) 224-6400	Complete systems
Sanders Associates 95 Canal Street Nashua, NH 03060 (603) 885-3731	Apple II
Video Associates Labs 2304 Hancock Drive Suite 1-F Austin, TX 78756 (512) 459-5684	Apple II
Video Design/Production Group P.O. Box 83111 Lincoln, NE 68501	TRS-80 Models I & II
Minnesota Educational Computing Consortium 3490 Lexington Ave North St. Paul, MN 55112 (612) 638-0600	Apple II



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Marilyn Sallee (Alliance, NE) is the first to send a one-line program for the *Crossed Name* problem:

```
1 INPUT"{SC}NAME";N$:I=22-LEN(N$)
:FORJ=0TOI:PRINTTAB(J)N$"{CU}":PR
INTTAB(I-J)N$:NEXT
```

Notice her effective use of the [SC] and [CU] commands.

So far, no one has sent a program using the PLOT kernal routine discussed in the January *Rupert Report* to position the cursor.

For single-purpose programs such as these in *Commodares*, it is probably software overkill to use such a routine. However, you might try the PLOT routine just to test your understanding of it.

Here is one possibility for solving the LOGICAL CONCLUSION problem of last month's *Commodares:*

```
10 REM << LOGICAL CONCLUSION <<
15 REM << FROM MARCH COMMODARES <
<
20 T=-1 :F=0
30 FOR A=T TO F : FOR B=T TO F
40 FOR C=T TO F : FOR D=T TO F
50 L1 = A AND NOT(B OR C)
70 L2 = A OR NOT D
80 L3 = A OR B OR C
90 IF (L1 = L2) AND (L3 = F) THEN
 PRINT A;B;C;D,L1;L2;L3
100 NEXT : NEXT : NEXT : NEXT
```

Lines 30, 40, and 100 generate every possible combination of values for A, B, C, and D. Lines 50 thru 90 evaluate the expressions and print all correct values. By running this program, you will see that only when D is true (−1) is the logical expression in line 90 true. You might add a line 45:

```
45 PRINT A;B;C;D
```

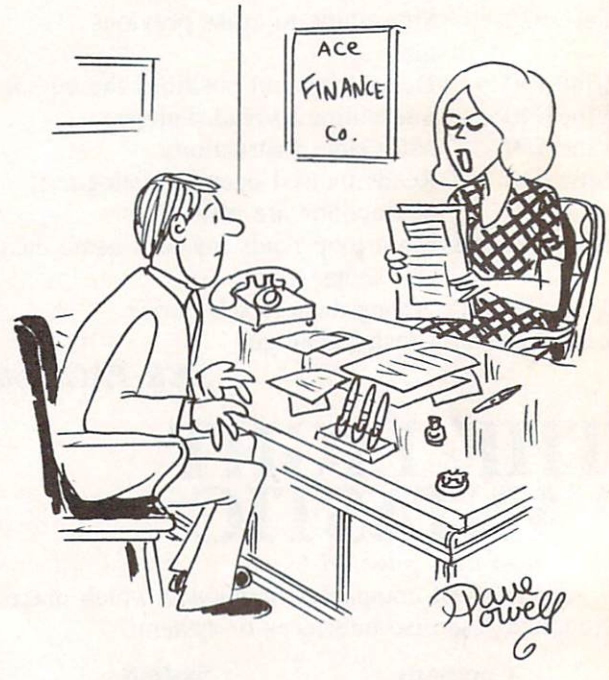
to see that all combinations are in fact generated.

Here is a somewhat diferent approach to solving Problem #4 — *Illogical Conclusion* from last month:

```
10 REM << ILLOGICAL CONCLUSION <<
20 REM << FROM MARCH COMMODARES <
<
30 PRINT " A"," B"," L"," R"
40 READ A,B
50 IF A=999 THEN END
60 L=NOT(A OR B)
70 R=NOT A AND NOT B
80 PRINT A,B,L,R
90 GOTO40
100 DATA -1,-1,-1,0,0,-1,0,0,999,
999
```

Line 100 contains all possible combinations for A and B where −1 means true and 0 means false. The 999's signal the end of the data in line 50. Run this program to see that for all values of A and B, the corresponding values of the left and right sides of the expression are equal. This shows that the first expression is valid. Now substitute new values for L and R in lines 60 and 70, and run it again. You should be able to determine the validity of any logical expression.

Although we read every letter you send, unfortunately we cannot respond individually to all your questions and comments. This is not to discourage you from writing. In fact, we hope you will continue with your enthusiastic responses. Much is to be gained by sharing ideas and suggestions. In this column, we will share with other readers as many of your ideas as we can. □



"Mr. Blake, according to our computer your last payment was made with negative thoughts behind it. . ."

PROGRAM LISTINGS

On the following pages are listed several programs that we hope you'll want to punch in your Commodore computer. But please read the following introduction first; there are a few things you'll need to know.

Certain computer commands are displayed on the monitor by a variety of odd-looking characters. To get your computer to display these commands rather than actually perform them, you'll need to enter the quote mode. Hold down the SHIFT key and press the "2" key; a set of quote marks will appear. This tells the computer that the characters that follow are to be displayed, not performed. To exit the quote mode, type another set of quote marks, or hit the RETURN key. You'll also enter the quote mode when you INserT spaces or characters onto a line.

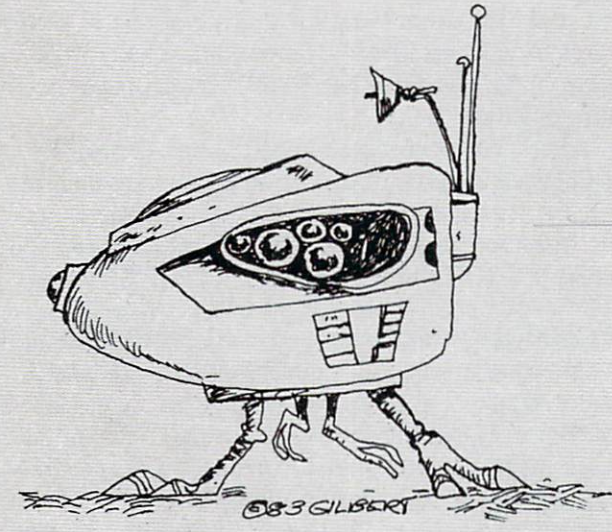
In *Ahoy!'s* program listings, you'll frequently find letters and/or numbers surrounded by brackets { }. That's because, for the purposes of clear reproduction, we at *Ahoy!* use a daisy wheel printer incapable of reproducing command symbols. For example, when you're in the quote mode and press the SHIFT and CLR/HOME keys at the same time, the screen (or a dot-matrix printer) will indicate this command with a heart {♥}. Because a daisy wheel cannot duplicate this symbol, it substitutes an alternate code between brackets. In the case of the SHIFT/CLR HOME symbol, our printer substitutes {SC}.

Another special case is SHIFT and COMMODORE characters. We represent these by underlining or overlining, respectively: any character underlined in the program listing should be punched in as a SHIFTed character ($\underline{J}$ = SHIFT J), any character overlined should be punched in as a COMMODORE character ($\overline{J}$ = COMMODORE J).

An alternate way of entering commands and other graphics symbols and characters is to use their corresponding character strings. The CLR/HOME command, for example, is entered by typing CHR$(147). While this requires a few extra strokes, it facilitates editing your program or reading the printed listing. For a complete list of CHR$ codes, consult the appendix at the back of your Commodore user manual.

Below is a list of the command abbreviations you'll find in our program listings, the commands they stand for, how to enter them, and how they'll appear on the screen or on a dot matrix printout.

When You See	It Means	You Type	You Will See	When You See	It Means	You Type	You Will See
{SC}	Screen Clear	SHIFT CLR/HOME		{YL}	Yellow	CNTRL 8	
{HM}	Home	CLR/HOME		{OR}	Orange	COMMODORE 1	
{CU}	Cursor Up	SHIFT ↑ CRSR ↓		{BR}	Brown	COMMODORE 2	
{CD}	Cursor Down	↑ CRSR ↓		{LR}	Light Red	COMMODORE 3	
{CL}	Cursor Left	SHIFT ← CRSR →		{G1}	Grey 1	COMMODORE 4	
{CR}	Cursor Right	← CRSR →		{G2}	Grey 2	COMMODORE 5	
{SS}	Shifted Space	SHIFT space		{LG}	Light Green	COMMODORE 6	
{IN}	Insert	INST		{LB}	Light Blue	COMMODORE 7	
{RV}	Reverse On	CNTRL 9		{G3}	Grey 3	COMMODORE 8	
{RO}	Reverse Off	CNTRL 0		{F1}	Function 1	F 1	
{BK}	Black	CNTRL 1		{F2}	Function 2	F 2	
{WH}	White	CNTRL 2		{F3}	Function 3	F 3	
{RD}	Red	CNTRL 3		{F4}	Function 4	F 4	
{CY}	Cyan	CNTRL 4		{F5}	Function 5	F 5	
{PU}	Purple	CNTRL 5		{F6}	Function 6	F 6	
{GN}	Green	CNTRL 6		{F7}	Function 7	F 7	
{BL}	Blue	CNTRL 7		{F8}	Function 8	F 8	



BUG REPELLENT

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```
•900 FORX= 49152 TO 49445 :READY:P
OKEX,Y:NEXT:END
•901 DATA 32, 161, 192, 165, 43, 1
33, 251, 165, 44, 133
•902 DATA 252, 160, 0, 230, 251, 2
08, 2, 230, 252, 177
•903 DATA 251, 208, 3, 76, 138, 19
2, 230, 251, 208, 2
•904 DATA 230, 252, 76, 43, 192, 7
6, 73, 78, 69, 32
•905 DATA 35, 32, 0, 169, 35, 160,
 192, 32, 30, 171
•906 DATA 160, 0, 177, 251, 170, 2
30, 251, 208, 2, 230
•907 DATA 252, 177, 251, 32, 205,
189, 169, 58, 32, 210
•908 DATA 255, 169, 0, 133, 253, 2
30, 251, 208, 2, 230
•909 DATA 252, 165, 253, 160, 0, 7
6, 16, 193, 133, 253
•910 DATA 177, 251, 208, 237, 165,
 253, 41, 240, 74, 74
•911 DATA 74, 74, 24, 105, 65, 32,
 210, 255, 165, 253
•912 DATA 41, 15, 24, 105, 65, 32,
 210, 255, 169, 13
•913 DATA 32, 220, 192, 230, 63, 2
08, 2, 230, 64, 230
•914 DATA 251, 208, 2, 230, 252, 7
6, 11, 192, 169, 153
•915 DATA 160, 192, 32, 30, 171, 1
66, 63, 165, 64, 76
•916 DATA 231, 192, 96, 76, 73, 78
, 69, 83, 58, 32
•917 DATA 0, 169, 247, 160, 192, 3
2, 30, 171, 169, 3
•918 DATA 133, 254, 32, 228, 255,
201, 83, 240, 6, 201
•919 DATA 80, 208, 245, 230, 254,
32, 210, 255, 169, 4
•920 DATA 166, 254, 160, 255, 32,
186, 255, 169, 0, 133
•921 DATA 63, 133, 64, 32, 189, 25
5, 32, 192, 255, 166
•922 DATA 254, 32, 201, 255, 169,
13, 32, 210, 255, 96
•923 DATA 32, 210, 255, 173, 141,
2, 41, 1, 208, 249
•924 DATA 96, 32, 205, 189, 169, 1
3, 32, 210, 255, 32
•925 DATA 204, 255, 169, 4, 76, 19
5, 255, 147, 83, 67
•926 DATA 82, 69, 69, 78, 32, 79,
82, 32, 80, 82
•927 DATA 73, 78, 84, 69, 82, 32,
63, 32, 0, 0
•928 DATA 0, 0, 170, 177, 251, 201
, 32, 240, 6, 138
•929 DATA 24, 113, 251, 10, 170, 1
38, 76, 88, 192, 0
•930 DATA 0, 0, 0, 0
```

BUG REPELLENT LINE CODES FOR BUG REPELLENT

LINE # 900:HA	LINE # 916:GA
LINE # 901:PE	LINE # 917:LM
LINE # 902:CE	LINE # 918:GE
LINE # 903:CI	LINE # 919:MA
LINE # 904:MA	LINE # 920:PE
LINE # 905:IM	LINE # 921:NI
LINE # 906:HI	LINE # 922:EA
LINE # 907:OI	LINE # 923:CE
LINE # 908:HI	LINE # 924:AA
LINE # 909:FE	LINE # 925:KM
LINE # 910:II	LINE # 926:EI
LINE # 911:FE	LINE # 927:KA
LINE # 912:DE	LINE # 928:II
LINE # 913:PI	LINE # 929:KA
LINE # 914:EE	LINE # 930:KA
LINE # 915:FA	LINES: 31

LUNAR LANDER

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```
•5 REM DEC. 19, 1983
•6 POKE 53280,8:POKE53281,0
•10 PRINT"{SC}{WH}{CD}{CD}{CD}{CD}            LUNAR LANDER"
•20 PRINT"{CD}                (C) COPYRIGHT 1983"
•30 PRINT"                    BY ANTHONY WOOD"
•50 POKE55,248:POKE56,157:REM 40440
•60 CLR:S=54272
•100 V=53248:S1=64*13:S2=64*14:S3=64*15:K=2040:SR=40444
•110 FORZ=0TO39:READA:POKE40456+Z,A
•120 POKES2+Z,A:POKES3+Z,A:NEXT
•130 FOR Z=40TO62:READA:POKE40456+Z,A:NEXT
•132 FORZ=40TO62:READA:POKES2+Z,A:NEXT
•134 FORZ=40TO62:READA:POKES3+Z,A:NEXT
•135 FORZ=1TO63*3:READA:POKE40518+Z,A:NEXT
•137 FORZ=0TO13:READA:POKE40441+Z,A:NEXT
•138 SYS40441
•139 FU=5000:F2=0:L1=0:L2=0:SC=0:GOSUB700
•140 GOSUB900:POKEV+39,1:POKEK,13:POKEV,0:POKEV+1,0:POKEV+21,1
•150 H=15:E=5:X=30+INT(RND(0)*100):Y=30:F(0)=13:F(1)=13:F(2)=14
•160 F(3)=15:M=1
•200 J=PEEK(56320):P=PEEK(197):IFFU=0THENB=0:M=1:POKES+1,0:GOTO220
•210 IFP=60OR(JAND16)=0THENB=B+1:GOTO213
•211 B=0:M=1:POKES+4,0
•213 IFM<>1THENPOKES+4,129
•215 IF P=7OR(JAND4)=0THENH=H-1:PRINT"{HM}{CD}{CR}<<":FU=FU-1
•216 IF P=2OR(JAND8)=0THENH=H+1:PRINT"{HM}{CD}{CR}>>":FU=FU-1
•220 GOSUB760:IFB=6ORB=1THENM=M+1
•240 E=E+GR-M*1.65:FU=FU-(M-1)*10:IFFU<0THENFU=0
•245 X=X+INT(H/6):Y=Y+INT(E/5)
•250 IFX<5THENX=5
•252 IFY>251THENY=252:GOSUB800:Y=35:X=29:FU=5000:F2=1:GOSUB5000
•255 IFY<35THENY=35:E=3
•256 IFX>319THENX=319
•260 POKEK,13:Z=PEEK(V+31):GOSUB800
•266 IFPEEK(V+31)<>0THEN300
•270 POKEK,F(M-FL):IFFL=0THENFL=1:GOTO200
•280 FL=0:GOTO200
•300 IFF2=1THEN440
•310 IFY<149THEN270
•320 IFY<227 ORX<099OR X>123 ORE>9ORABS(H)>10THEN330
•322 IF L1=1ANDL2=1THEN330
•325 Y=227:GOSUB800:SC=SC+100:L2=1
•327 GOTO400
•330 IFY<177 ORX<197 ORX>203 ORE>9 ORABS(H)>10THEN340
•335 Y=179:GOSUB800:SC=SC+500:L1=1:GOTO400
•340 POKES+4,129:V2=11:POKESR,63+8:SYS40441:GOSUB820:POKESR,126+8:SYS40441
•350 GOSUB840:POKESR,189+8:SYS40441:GOSUB840:POKES+4,0:POKES+24,15:POKES+1,2
•360 POKEV+21,0:POKESR,8:SYS40441:GOTO410
•400 POKES+4,0:GOSUB750:PRINT"{HM} LANDED!!"
•410 GETA$:IFA$<>"{F7}"THEN410
•415 POKEV+21,0:PRINT"{HM}
 "
•420 IFFU=0THEN 460
•425 IFF2=1THENY=10:X=29:E=5:H=0:GOSUB5000:POKEV,X:POKEV+1,Y:POKEV+21,1:GOTO160
•435 GOTO140
•440 IFX<230ORX>242ORY<121ORY>130ORE>9ORABS(H)>11THEN340
•450 F2=0:SC=SC+1000:L1=0:L2=0:FU=4500:GOTO400
•460 PRINT"{SC}":PRINT:PRINT"DO YO
```

```
U WANT TO PLAY AGAIN?"
•470 GETA$:IFA$=""THEN470
•480 IFA$="Y"THEN139
•490 IFA$<>"N"THEN470
•500 POKES+4,0:PRINT"{SC}":END
•700 PRINT:PRINT:PRINT"  ENTER GRA
VITY STRENGTH ({RV}1{RO},{RV}2{RO
}, OR {RV}3{RO})"
•701 POKES+5,129:POKES+6,216:POKES
+24,15
•702 POKES,200:POKES+4,0:POKES+1,2
•710 GETA$:IFA$=""THEN710
•715 IFA$="1"THENGR=3:RETURN
•720 IFA$="2"THENGR=3.6:RETURN
•730 IFA$="3"THENGR=4.25:RETURN
•740 GOTO710
•750 PRINT"{HM}{CR}{CR}{CR}{CR}{CR
}{CR}{CR}{CR}{CR}{CR}{CR}{CR}{CR}
{CR}{CR}{CR}{CR}SCORE";SC;
•760 PRINT"{HM}{CD}{CR}  {HM}";TAB
(28);"FUEL      {CL}{CL}{CL}{CL}{C
L}";FU;:RETURN
•800 POKEV+1,Y:IFX<256THENPOKEV,X:
POKEV+16,0:RETURN
•810 POKEV,X-256:POKE53264,127:RET
URN
•820 POKES+1,3:FORX=1TO4:POKES+24,
V2:FORY=1TO15:NEXT:V2=V2+1
•830 NEXT:RETURN
•840 FORX=1TO7:POKES+24,V2:FORY=1T
O9:NEXT:V2=V2-1:NEXT:RETURN
•900 PRINT"{SC}":GOSUB750:PRINT:FO
RY=0TO9:A=RND(0)
•910 IFA>.3THENPRINTTAB(RND(0)*39)
;"."
•920 IF A<=.3THENPRINT
•930 NEXT:PRINT:PRINT:PRINT
•1000 PRINT"
        {RV}£*{RO}       "
•1100 PRINT"
       {RV}£  *{RO}      "
•1200 PRINT"
      {RV}£      *{RO}    "
•1300 PRINT"
    {RV}£          *{RO}   "
•1400 PRINT"                     {
RV}£              {RO} "
•1500 PRINT"                     {R
V}£ 500            *{RO}"
•1600 PRINT"      {RV}£ *{RO}
      {RV}£                  {RO} "
•1700 PRINT"      {RV}£    {RO}
    {RV}£                    *{RO}
"
•1800 PRINT"   {RV}£      *{RO}
   {RV}£                      {RO}
"
•1900 PRINT" {RV}£          *{RO}
 {RV}£                         *{RO}
"
•1910 PRINT"{RV}              100
                          {RO}";
•1920 IFL2=1ANDL1=1THENPRINT"{HM}{
CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{C
D}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CR}
{CR}{CR}{CR}{CR}{CR}{CR}{CR}{CR}{
CR}{RV}*{RO}    {RV}£{RO}";
•1930 RETURN
•1999 REM LANDER SPRITES
•2000 DATA 0,255,0,0,255,0,7,255,2
24,7
•2010 DATA 255,224,7,255,224,0,255
,0,0,255
•2020 DATA 0,15,255,240,15,255,240
,15,255,240
•2030 DATA 3,255,192,3,60,192,6,12
6,96,12
•2040 REM NO FLAME
•2050 DATA 0,48,24,0,24,0,0,0,0,0
•2060 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0
•2070 REM SMALL FLAME
•2080 DATA 0,48,24,60,24,0,102,0,0
,60
•2090 DATA 0,0,24,0,0,24,0,0,0,0,0
,0,0
•2100 REM  BIG FLAME
•2110 DATA 0,48,24,126,24,0,219,0,
0,219
•2120 DATA 0,0,102,0,0,60,0,0,24,0
,0,24,0
•2130 REM EXPLOSION
•2140 DATA 0,0,0,0,0,0,0,0
•2150 DATA 0,0,0,0,0,0,0,0
•2160 DATA 64,0,6,72,0,0,24,0
•2170 DATA 12,224,0,0,228,0,0,0
•2180 DATA 0,13,80,0,0,0,0,0
•2190 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0
•2200 DATA 0,0,0,0,0,0,0,0,0,0
•2210 REM FRAME 2 OF EXPLOSION
•2220 DATA 0,0,0,0,0,0,0,0
•2230 DATA 0,0,128,0,24,131,0,24
•2240 DATA 3,0,0,0,0,0,0,0
•2250 DATA 48,224,0,48,227,0,0,0
```

```
•2260 DATA 0,0,0,0,28,0,0,24
•2270 DATA 152,0,2,8,0,0,64,0
•2280 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0
•2290 REM FRAME 3 OF EXPLOSION
•2300 DATA 0,0,0,0,0,0,0,0
•2310 DATA 0,0,128,128,24,129,0,24
•2320 DATA 0,0,0,0,0,0,0,0
•2330 DATA 64,0,0,64,0,112,0,0
•2340 DATA 0,0,0,0,32,0,208,32
•2350 DATA 0,0,0,0,0,0,2,0
•2360 DATA 4,65,0,4,64,128,0,0
•2370 DATA 0,0,0,0,0,0,0
•2380 REM BLOCK MOVE
•2390 DATA 162,0,189,8,158,157,64,
3,232
•2400 DATA 224,63,208,245,96
•4999 REM DRAW CAVE
•5000 PRINT"{SC}":GOSUB750:PRINT:P
OKES+4,0:POKES+1,2
•5005 PRINT"      {RV}
                              "
•5010 PRINT"      {RV}
                              "
•5020 PRINT"      {RV}
                              "
•5030 PRINT"      {RV}
                              "
•5040 PRINT"      {RV}
                              "
•5050 PRINT"      {RV}
       {RO}£   *£ *{RV} {RO}£   *{R
V}  "
•5060 PRINT"      {RV}
      {RO}                    "
•5065 PRINT"      {RV}
      {RO}                    "
•5070 PRINT"      {RV}
      {RO}                    "
•5080 PRINT"      {RV}
       {RO} PPPP              "
•5090 PRINT"      {RV}
                {RO}          "
•5100 PRINT"      {RV}
        1000    {RO})         "
•5200 PRINT"      {RV}
                {RO})         "
•5210 PRINT"      {RV}
               {RO})          "
•5220 PRINT"      {RV}
              {RO})           "
•5230 PRINT"        *£*£*£*£*{RV}   {R
O}£*{RV}  {RO}£*£*{RV}  {RO}£*£
                   "
•5240 PRINT"                      *£
                   {RV}£   {RO}"
•5250 PRINT"
                  {RV}£     {RO}"
•5260 PRINT"
                 {RV}£      {RO}"
•5270 PRINT"
               {RV}£        {RO}"
•5285 PRINT"
             {RV}£          {RO}"
•5285 PRINT"                {RV}£*{R
O}              {RV}          {RO}
"
•5290 PRINT"{RV}
                            {RO}"
•5295 PRINT"{RV}
                            {RO}";
•5300 PRINT"{HM}{CD}{CD}{CD}";TAB(
38);"{RV} {CD}{CL} {CD}{CL} {CD}{
CL} {CD}{CL} {CD}{CL} {CD}{CL} {C
D}{CL} {CD}{CL} {CD}{CL} {CD}{CL}
 {CD}{CL} {CD}{CL} {CD}{CL} {CD}{
CL} {CD}{CL} {RO}";
•6000 RETURN
```

BUG REPELLENT LINE CODES FOR LUNAR LANDER

LINE # 5:LM	LINE # 215:CM
LINE # 6:DA	LINE # 216:CM
LINE # 10:OI	LINE # 220:OE
LINE # 20:AA	LINE # 240:CA
LINE # 30:LI	LINE # 245:DM
LINE # 50:CA	LINE # 250:IE
LINE # 60:GA	LINE # 252:CA
LINE # 100:LA	LINE # 255:KM
LINE # 110:EE	LINE # 256:FM
LINE # 120:OI	LINE # 260:GA
LINE # 130:OI	LINE # 266:NA
LINE # 132:OI	LINE # 270:IA
LINE # 134:OI	LINE # 280:AA
LINE # 135:OI	LINE # 300:MA
LINE # 137:OI	LINE # 310:LI
LINE # 138:KE	LINE # 320:OI
LINE # 139:NA	LINE # 322:KI
LINE # 140:PE	LINE # 325:HE
LINE # 150:BI	LINE # 327:KA
LINE # 160:CE	LINE # 330:PA
LINE # 200:BA	LINE # 335:KA
LINE # 210:JE	LINE # 340:KE
LINE # 211:OA	LINE # 350:LI
LINE # 213:AE	LINE # 360:KI

```
LINE # 400:GA
LINE # 410:OI
LINE # 415:OA
LINE # 420:JA
LINE # 425:KA
LINE # 435:JA
LINE # 440:DA
LINE # 450:CA
LINE # 460:EA
LINE # 470:BI
LINE # 480:GM
LINE # 490:BI
LINE # 500:FA
LINE # 700:NA
LINE # 701:PA
LINE # 702:LI
LINE # 710:BI
LINE # 715:HI
LINE # 720:OI
LINE # 730:BI
LINE # 740:NI
LINE # 750:JE
LINE # 760:FI
LINE # 800:II
LINE # 810:PI
LINE # 820:HE
LINE # 830:CI
LINE # 840:CI
LINE # 900:AE
LINE # 910:DI
LINE # 920:IM
LINE # 930:EE
LINE # 1000:KI
LINE # 1100:KI
LINE # 1200:KI
LINE # 1300:KI
LINE # 1400:OI
LINE # 1500:II
LINE # 1600:OI
LINE # 1700:KI
LINE # 1800:OI
LINE # 1900:KI
LINE # 1910:JM
LINE # 1920:LM
LINE # 1930:DI
LINE # 1999:FE
LINE # 2000:DM
LINE # 2010:BM
LINE # 2020:MA
LINE # 2030:BA
LINE # 2040:AM
LINE # 2050:KA
LINE # 2060:KA
LINE # 2070:IM
LINE # 2080:DA
LINE # 2090:KA
LINE # 2100:AM
LINE # 2110:AM
LINE # 2120:KA
LINE # 2130:GA
LINE # 2140:KA
LINE # 2150:KA
LINE # 2160:KA
LINE # 2170:KA
LINE # 2180:KA
LINE # 2190:KA
LINE # 2200:KA
LINE # 2210:GA
LINE # 2220:KA
LINE # 2230:KA
LINE # 2240:KA
LINE # 2250:KA
LINE # 2260:CA
LINE # 2270:CA
LINE # 2280:KA
LINE # 2290:GA
LINE # 2300:KA
LINE # 2310:KA
LINE # 2320:KA
LINE # 2330:KA
LINE # 2340:CA
LINE # 2350:MA
LINE # 2360:KA
LINE # 2370:KA
LINE # 2380:JE
LINE # 2390:MA
LINE # 2400:AA
LINE # 4999:HE
LINE # 5000:LI
LINE # 5005:FI
LINE # 5010:FI
LINE # 5020:FI
LINE # 5030:FI
LINE # 5040:FI
LINE # 5050:KI
LINE # 5060:LI
LINE # 5065:LI
LINE # 5070:LI
LINE # 5080:JA
LINE # 5090:LI
LINE # 5100:PA
LINE # 5200:DA
LINE # 5210:DA
LINE # 5220:DA
LINE # 5230:GA
LINE # 5240:KI
LINE # 5250:OI
LINE # 5260:OI
LINE # 5270:OI
LINE # 5280:OI
LINE # 5285:LI
LINE # 5290:LI
LINE # 5295:FM
LINE # 5300:HM
LINE # 6000:DI
LINES: 163
```

NAME THAT STAR

From page 78

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
•1 REM **** "NAME THAT STAR" V2.0
   ****
•2 REM **  DESIGNED BY: BOB LLORET
   **
•3 REM ****  FOR: AHOY' MAGAZINE
   ****
•4 REM
•60 PRINT "{SC}":POKE 53280,4:POKE
  53281,7
•70 PRINT TAB(8);"{BR}{CD}{CD}{CD}
 {CD}CONTESTANTS APPLICATION"
•80 PRINT TAB(8);"{BL}{CD}{CD}{CD}
 {CD}{CD}FIRST NAME:";:INPUT NAME$
•85 PRINT TAB(8);"{RD}{CD}{CD}{CD}
 {CD}CONGRATULATIONS...";NAME$;","
•90 PRINT TAB(8);"{RD}{CD}YOU HAVE
  BEEN ACCEPTED.":FOR D=1 TO 3000:
 NEXT D
•100 PRINT "{SC}":GOSUB 880:GOSUB
 900
•110 PRINT TAB(18);"{CU}{CU}{CU}{C
 U}{CU}{CU}{CU}";A$:PRINT TAB(18);
 "{CU}";A4$
•120 GOSUB 1000
•130 FOR D=1 TO 1500:NEXT D:PRINT
 "{G3}{CU}{CU}{CU}{CU}{CU}";
•140 GOSUB 1460
•170 FOR D=1 TO 3000:NEXT D
•180 PRINT "{CD}{CD}":GOSUB 1000:P
 RINT TAB(18);A$:PRINT TAB(18);A1$
•190 PRINT "{CU}{CU}{CU}{CU}{CU}{C
 U}{CU}{CU}":GOSUB 1460:PRINT TAB(
 16);"{CU}, ";NAME$
•200 FOR D=1 TO 2500:NEXT D:PRINT
```

```
"{CD}{CD}{CD}":GOSUB 1000
•210 PRINT TAB(10);"{CU}{CU}{CU}{C
U}{CU}DO YOU WANT ME TO":PRINT TA
B(10);"EXPLAIN THE GAME"
•215 PRINT TAB(10);NAME$;" ?"
•220 PRINT TAB(18);"TYPE Y/N"
•230 GET BY$:IF BY$="" THEN 230
•240 IF BY$="N" THEN 340
•250 PRINT"{CD}":GOSUB 1000
•260 PRINT TAB(18);A$:PRINT TAB(18
);"    ":PRINT TAB(18);"{CU}{CU}";
A3$
•270 PRINT "{CU}{CU}{CU}{CU}{CU}{C
U}{CU}{CU}":GOSUB 1460
•280 GET AN$:IF AN$<>"C" THEN 280
•290 PRINT "{CD}":GOSUB 1000:PRINT
 "{CU}{CU}{CU}{CU}{CU}{CU}":GOSUB
 1460
•300 GET AN$:IF AN$<>"C" THEN 300
•310 PRINT "{CD}":GOSUB 1000:PRINT
 "{CU}{CU}{CU}{CU}{CU}{CU}":GOSUB
 1460
•315 GET AN$:IF AN$<>"C" THEN 315
•320 PRINT "{CD}":GOSUB 1000:PRINT
 "{CU}{CU}{CU}{CU}{CU}{CU}":GOSUB
 1460
•330 GET AN$:IF AN$<>"C" THEN 330
•340 PRINT "{CD}":GOSUB 1000:PRINT
 "{CU}{CU}{CU}{CU}{CU}{CU}"
•350 PRINT TAB(10);"IF YOU'RE READ
Y":PRINT TAB(10);"TO GO..."
•360 PRINT TAB(10);"    LET'S PLAY
":PRINT TAB(10);"  NAME THAT STAR
"
•365 FOR D=1 TO 1200:NEXT D
•370 PRINT:PRINT:FOR A=1 TO 20:PRI
NT TAB(18);"{CU}";A$:PRINT TAB(18
);A5$
•380 FOR D=1 TO 50:NEXT:PRINT TAB(
18);"{CU}   ":PRINT TAB(18);"{CU}
{CU}";A4$
•390 FOR D=1 TO 50:NEXT D:NEXT A
•400 PRINT "{CU}":GOSUB 1000
•410 IF BY$="N" THEN FOR A=1 TO 20
:READ JUNK$:NEXT A
•420 PRINT TAB(18);A$:PRINT TAB(18
);"{CU}";A3$:PRINT "{CU}{CU}{CU}{
CU}{CU}{CU}{CU}{CU}"
•430 PRINT TAB(10);"OUR FIRST MYST
ERY":PRINT TAB(10);"NAME IS...."
•435 FOR D=1 TO 2500:NEXT D
•440 PRINT "{CD}{CD}{CD}":GOSUB 10
00:GOTO 465
•447 REM
•448 REM [ ****  MAIN LOOP  **** ]
•449 REM ========================
•450 IF MN=40 THEN 750
•455 PRINT TAB(10);"OUR NEXT MYSTE
RY":PRINT TAB(10);"NAME IS...."
•460 FOR D=1 TO 2000:NEXT D:PRINT
"{CD}{CD}{CD}":GOSUB 1000
•465 N=1:G=0:MN=MN+1
•470 READ N$:IF N>1 THEN 475
•472 PRINT TAB(12);"{CU}{CU}{CU}{C
U}{CU}{CU}{CU}{CU}{CU}{CU}";N
$;"        ":N=N+1:GOTO 470
•475 PRINT "{CD}{CD}{CD}{CD}"
•480 READ CL$:IF CL$="0" THEN 500
•490 PRINT TAB(10);CL$:GOTO 480
•500 G=G+1:PRINT TAB(13);"{CU}{CU}
{CU}{CU}{CU}{CU}{CU}{CU}
        "
•505 PRINT TAB(12);"{CU}";G;:INPUT
 GUE$
•510 IF GUE$=N$ THEN 535
•520 IF LEFT$(GUE$,5)=LEFT$(N$,5)
THEN 535
•530 IF GUE$<> N$ THEN GOTO 590
•535 SC=SC+1:PRINT "{CD}{CD}{CD}{C
D}{CD}{CD}{CD}{CD}"
•540 GOSUB 560:GOSUB 1000:PRINT TA
B(10);"{CU}{CU}{CU}{CU}{CU}CORREC
T, ";NAME$
•545 PRINT TAB(10);"YOU NOW HAVE";
SC:PRINT TAB(10);"CORRECT"
•550 FOR D=1 TO 2000:NEXT D:PRINT
"{CD}{CD}":GOSUB 1000:PRINT "{CU}
{CU}{CU}{CU}{CU}{CU}"
•555 GOTO 450
•560 SI=54272:FOR A=0 TO 24:POKE S
I+A,0:NEXT A:POKE SI+24,15:POKE S
I+6,255
•565 FOR A=1 TO 6:FOR Z=50 TO 105
STEP 15:POKE SI,Z:POKE SI+1,Z:POK
E SI+4,17
•570 NEXT Z:NEXT A:POKE SI+4,16:PO
KE SI,0:POKE SI+1,0:RETURN
•580 REM [ *** WRONG ANSWERS *** ]
•585 REM ========================
•590 IF G>1 THEN 640
•600 PRINT "{CD}{CD}{CD}{CD}{CD}{C
D}{CD}{CD}":GOSUB 1000:PRINT TAB(
10)"{CU}{CU}{CU}{CU}{CU}WRONG,";N
AME$
•610 PRINT TAB(10);"YOU HAVE 2 GUE
SSES":PRINT TAB(10);"LEFT."
```

```
•620 PRINT TAB(10);"LET'S TRY AGAI
 N..":PRINT "{CD}":FOR D=1 TO 2000
 :NEXT D
•630 GOSUB 1000:PRINT "{CU}{CU}":G
 OTO 500
•640 IF G>2 THEN 690
•650 PRINT "{CD}{CD}{CD}{CD}{CD}{C
 D}{CD}{CD}":GOSUB 1000:PRINT TAB(
 10)"{CU}{CU}{CU}{CU}{CU}WRONG {RD
 }AGAIN{OR},";NAME$
•660 PRINT TAB(10);"YOU HAVE 1 GUE
 SS":PRINT TAB(10);"LEFT."
•670 PRINT TAB(10);"LET'S TRY AGAI
 N..":PRINT "{CD}":FOR D=1 TO 2000
 :NEXT D
•680 GOSUB 1000:PRINT "{CU}{CU}":G
 OTO 500
•690 PRINT "{CD}{CD}{CD}{CD}{CD}{C
 D}{CD}{CD}":GOSUB 1000:PRINT TAB(
 10)"{CU}{CU}{CU}{CU}{CU}I'M SORRY
 ,";NAME$
•700 PRINT TAB(10);"BUT THIS FAMOU
 S":PRINT TAB(10);"PERSON IS..."
•710 PRINT TAB(10);N$:PRINT "{CD}"
 :FOR D=1 TO 3000:NEXT D
•720 GOSUB 1000:PRINT "{CU}{CU}{CU
 }{CU}{CU}{CU}":GOTO 450
•745 REM ***  CLOSING DIALOGUE  **
 *
•746 REM =========================
 =
•750 PRINT TAB(10);"{YL}WELL,";NAM
 E$;", ITS":PRINT TAB(10);"TIME FO
 R US TO"
•760 PRINT TAB(10);"BE LEAVING YOU
 ,BUT":PRINT TAB(10);"BEFORE WE GO
 ..."
•765 FOR D=1 TO 3000:NEXT D
•770 PRINT "{CD}":GOSUB 1000:PRINT
  "{CU}{CU}{CU}{CU}{CU}{CU}":PRINT
  TAB(10);"{YL}MAY I SAY THAT YOU"
•780 PRINT TAB(10);"HAVE BEEN A WO
 ND-":PRINT TAB(10);"ERFUL GUEST A
 ND A"
•790 PRINT TAB(10);"GOOD SPORT. SO
  LONG"
•800 FOR D=1 TO 500:NEXT D
•810 PRINT:PRINT:PRINT:FOR A=1 TO
 50:PRINT TAB(18);"{CU}{CU}";A$:PR
 INT TAB(18);A1$
•820 FOR D=1 TO 100:NEXT:PRINT TAB
 (18);"{CU}   ":PRINT TAB(18);"{CU
 }{CU}";A3$
•830 FOR D=1 TO 100:NEXT D:NEXT A
•840 END
•878 REM [ ** CHAR. ASSIGNMENT **
 ]
•879 REM =========================
 =
 880 A$="{YL} Q ":A1$="{YL}NTM":A3
 $="{YL}M{CD}TM":A4$="{YL}M{CD}T{C
 U}N":A5$="{YL}YTY"
•890 RETURN
•898 REM [ *** MAIN SCREEN *** ]
•899 REM =======================
•900 PRINT "{SC}":POKE 53280,6:POK
 E 53281,0
•910 PRINT TAB(10);"{RD}££££££££££
 ££££££££££":PRINT TAB(10);"F
            F"
•920 PRINT TAB(10);"F {YL} NAME TH
 AT STAR{RD}  F"
•930 PRINT TAB(10);"F£££££££££££££
 £££££F":PRINT SPC(7);"{LB}{CD}NAM
 E:"
•940 PRINT SPC(6);"{CD}{GN}GUESS:"
 :PRINT "{PU}{CD}       £££££    ££££
 £   £££££   £££££"
•960 PRINT TAB(15);"{BR}{RV}{CD}{C
 D}{CD}{CD}{CD}{CD}{CD}{CD}
  ":PRINT TAB(15);"{YL}{RV} NAME
  "
•970 PRINT TAB(15);"{RV}  THAT  ":
 PRINTTAB(15);"{RV}   STAR ":PRINT
 TAB(15);"{RV}{BR}        "
•980 RETURN
•998 REM [ ** DIALOGUE CIRCLE ** ]
•999 REM =========================
•1000 PRINT TAB(8);"{OR}{CU}{CU}{C
 U}{CU}{CU}{CU}{CU}UCCCCCCCCCCCCC
 CCCCCCI"
•1010 PRINT TAB(8);"B
       B"
•1020 PRINT TAB(8);"B
       B"
•1030 PRINT TAB(8);"B
       B"
•1040 PRINT TAB(8);"B
       B"
•1060 PRINT TAB(8);"JCCCCCCCCCICC
 CCCCCCCK"
•1070 RETURN
•1460 READ SENT$:IF SENT$="0" THEN
  RETURN
•1470 PRINT TAB(10);"{OR}";SENT$:G
 OTO 1460
```

```
1498 REM [ * OPENING DIALOGUE * ]
1499 REM ========================
1500 DATA HELLO LADIES AND
1510 DATA GENTLEMEN. WELCOME
1520 DATA TO NAME THAT STAR.,0
1530 DATA LET'S WELCOME OUR
1540 DATA PLAYER,0
1550 DATA I WILL DISPLAY A
1560 DATA FAMOUS NAME WHERE
1570 DATA IT SAYS "NAME"
1580 DATA TYPE C TO CONTINUE,0
1590 DATA THE NAME WILL BE
1600 DATA JUMBLED SO YOU CAN
1610 DATA NOT READ IT...
1620 DATA TYPE C TO CONTINUE,0
1630 DATA I WILL GIVE YOU A
1640 DATA CLUE SO YOU CAN
1650 DATA TRY TO GUESS IT.
1660 DATA TYPE C TO CONTINUE,0
1670 DATA YOU'LL ONLY GET 3
1680 DATA TRIES TO GUESS IT-
1690 DATA OTHERWISE YOU LOSE
1700 DATA TYPE C TO CONTINUE,0
1704 REM
1705 REM [ ** MYSTERY NAMES ** ]
1706 REM ======================
1710 DATA KMCI RAGEJG,MICK JAGGER
1720 DATA HE'S A HARD PERSON
1730 DATA TO SATISFY...
1740 DATA WHO IS THIS FAMOUS
1750 DATA PERSON ?,0
1760 DATA SVILE SPLEREY,ELVIS PRE
SLEY
1770 DATA HIS TITLE IS KING
1780 DATA BUT HE HAS PASSED
1790 DATA WHO IS THIS FAMOUS
1800 DATA RECORDING STAR?,0
1810 DATA NEPCERS CARYT,SPENCER T
RACY
1820 DATA HIS FAMOUS PARTNER
1830 DATA WAS "KATE"...
1840 DATA WHO IS THIS FAMOUS
1850 DATA ACTOR?,0
1860 DATA RONLAM RODBAN,MARLON BR
ANDO
1870 DATA WORKED THE DOCKS
1880 DATA LIVED IN PARIS HAD
1890 DATA ITALIAN HERITAGE
1900 DATA WHO IS HE?,0
1910 DATA MAJES SNARES,JAMES ARNE
SS
1920 DATA THAT "THINGS" SCARY
1930 DATA WORE A SIX SHOOTER
1940 DATA WHO IS THIS FAMOUS
1950 DATA ACTOR ?,0
1960 DATA NJHO YENAW,JOHN WAYNE
1970 DATA HIS TITLE WAS DUKE
1980 DATA SAT TALL IN THE
1990 DATA SADDLE
2000 DATA WHO IS HE ?,0
2010 DATA CRAEGI NEALL,GRACIE ALL
EN
2020 DATA SHE WAS MARRIED TO
2030 DATA HER STRAIGHT MAN
2040 DATA NOT TOO INTELLIGENT
2050 DATA WHO IS SHE ?,0
2060 DATA ABBE HURT,BABE RUTH
2070 DATA CARRIED BIG STICK
2080 DATA BULGING WAIST LINE
2090 DATA KNOWN FOR RECORDS
2100 DATA WHO IS THIS STAR ?,0
2110 DATA CLAREIH PHLANCI,CHARLIE
 CHAPLIN
2120 DATA A DERBY A CANE AND
2130 DATA TAILS WERE THIS
2140 DATA MAN'S TRADEMARK
2150 DATA WHO IS HE ?,0
2160 DATA ROVELI YRHDA,OLIVER HAR
DY
2170 DATA HE WAS ALWAYS IN
2180 DATA ANOTHER FINE MESS
2190 DATA NAME THIS FAMOUS
2200 DATA T.V. COMIC ?,0
2210 DATA KEAJIC SNOGELA,JACKIE G
LEASON
2220 DATA ONLY HIS SIZE OUT-
2230 DATA WEIGHED HIS COMEDY
2240 DATA WHO IS THIS WELL
2250 DATA KNOWN STAR ?,0
2260 DATA DALNOR GRANEA,RONALD RE
AGAN
2270 DATA THIS MAN'S CAREER
2280 DATA WENT FROM HOLLYWOOD
2290 DATA TO WASHINGTON...
2300 DATA WHO IS THIS STAR,0
2310 DATA RASHNOIR OFDR,HARRISON
FORD
2320 DATA HAS A STATE FOR A
2330 DATA FIRST NAME
2340 DATA HAS A WOOKIE FOR
2350 DATA CO-PILOT....,0
2360 DATA CHOUGRO AXRM,GROUCHO MA
RX
2370 DATA SMOKED A BIG CIGAR
2380 DATA HEAVY EYEBROWS AND
2390 DATA MUSTACHE...
```

```
•2400 DATA WHO IS HE ?,0
•2410 DATA KJAC GULKNAM,JACK KLUGM
AN
•2420 DATA SLOPPY ROOM MATE
•2430 DATA MEDICAL EXAMINER
•2440 DATA LOVES THE HORSES
•2450 DATA WHO IS THIS ACTOR ?,0
•2460 DATA YANDN MOTSAH,DANNY THOM
AS
•2470 DATA THERE WAS ALWAYS
•2480 DATA ROOM FOR DADDY
•2490 DATA WHO IS THIS BIG
•2500 DATA NOSED TV ACTOR,0
•2510 DATA ELE JAMROS,LEE MAJORS
•2520 DATA WAS MARRIED TO AN
•2530 DATA ANGEL- KEEPS ON
•2540 DATA FALLING
•2550 DATA WHO IS THIS STAR ?,0
•2560 DATA LILB BYIXB,BILL BIXBY
•2570 DATA A HULK OF A MAN
•2580 DATA FRIENDLY ONLY TO
•2590 DATA MARTIANS
•2600 DATA WHO IS HE ?,0
•2610 DATA RNEYH LEWNIKR,HENRY WIN
KLER
•2620 DATA HIS THUMBS ARE HIS
•2630 DATA TRADEMARK- HIS DAYS
•2640 DATA WERE ALWAYS HAPPY
•2650 DATA WHO IS THIS ACTOR ?,0
•2660 DATA OBB RENDEV,BOB DENVER
•2670 DATA A BEATNIK WHO WAS
•2680 DATA SHIPWRECKED ON AN
•2690 DATA ISLAND...
•2700 DATA WHO IS HE ?,0
•2710 DATA BOR NEERIR,ROB REINER
•2720 DATA HIS FATHER-IN-LAW
•2730 DATA CALLED HIM MEATHEAD
•2740 DATA FATHER'S NAME CARL
•2760 DATA WHO IS HE ?,0
•2770 DATA HONJ THORSYFE,JOHN FORS
YTHE
•2780 DATA HIS BACHELORHOOD
•2790 DATA LED TO A DYNASTY
•2800 DATA WHO IS THIS FAMOUS
•2810 DATA TV ACTOR ?,0
•2820 DATA RAYM TERLY ROEMO,MARY T
YLER MOORE
•2830 DATA RHODA'S BEST FRIEND
•2840 DATA ROB'S WIFE
•2850 DATA FAMOUS TV AND MOVIE
•2860 DATA ACTRESS ?,0
•2870 DATA VAING DOMLACE,GAVIN MAC
LEOD
•2880 DATA LOVES HIS BOAT
•2890 DATA WORKED FOR LOU
•2900 DATA WHO IS THIS WELL
•2910 DATA KNOWN TV ACTOR,0
•2920 DATA NOMDED WINSLO,DEMOND WI
LSON
•2930 DATA HIS LAZY FATHER
•2940 DATA BUILT A JUNK EMPIRE
•2950 DATA THIS TV ACTOR WAS
•2960 DATA ALSO VERY ODD,0
•2970 DATA TREEP KLAF,PETER FALK
•2980 DATA HIS RAINCOAT WAS A
•2990 DATA TRADEMARK...LOOKED
•3000 DATA FROM ONE SIDE
•3010 DATA A FAMOUS MOVIE STAR,0
•3020 DATA OLU STOLLECO,LOU COSTEL
LO
•3030 DATA NEVER KNEW THE
•3040 DATA NAMES OF THE BASE-
•3050 DATA BALL TEAM... WHO
•3060 DATA WAS THIS STAR ?,0
•3070 DATA CHRIDAR SEYDURFS,RICHAR
D DREYFUSS
•3080 DATA LOOKED AT A LARGE
•3090 DATA SET OF JAWS- HAD A
•3100 DATA CLOSE ENCOUNTER
•3110 DATA A FAMOUS ACTOR,0
•3120 DATA NEORDAL YINOM,LEONARD N
IMOY
•3130 DATA A STARSHIP WAS HIS
•3140 DATA ENTERPRISE-HIS
•3150 DATA TOUCH PARALYZING
•3160 DATA A FAMOUS ACTOR,0
•3170 DATA LYTLE LAVSAAS,TELLY SAV
ALAS
•3180 DATA A BALD DETECTIVE
•3190 DATA LOVED A LOLLIPOP
•3200 DATA GREEK HERITAGE..WHO
•3210 DATA IS THIS ACTOR ?,0
•3220 DATA HONJ LAVRATTO,JOHN TRAV
OLTA
•3230 DATA RAN A HIGH TEMP.
•3240 DATA ON SAT. NIGHT BUT
•3250 DATA STAYED ALIVE
•3260 DATA WHO IS HE ?,0
•3270 DATA CHAMIEL NODNAL,MICHAEL
LANDON
•3280 DATA WENT FROM A LARGE
•3290 DATA RANCH TO A LITTLE
•3300 DATA HOUSE...WHO IS THIS
•3310 DATA FAMOUS ACTOR ?,0
•3320 DATA HONNJY ROSNAC,JOHNNY CA
RSON
```

```
•3330 DATA SIDEKICKS DOC & ED
•3340 DATA HELPED GET HIM
•3350 DATA THROUGH TONIGHT
•3360 DATA WHO IS HE ?,0
•3370 DATA TNICL SOOTDAWE,CLINT EA
STWOOD
•3380 DATA A MONKEY WAS HIS
•3390 DATA PAL-THIS TOUGH GUY
•3400 DATA WAS NEVER CLEAN
•3410 DATA WHO IS THIS STAR,0
•3420 DATA ROSBI FALKROF,BORIS KAR
LOFF
•3430 DATA THIS MONSTER OF AN
•3440 DATA ACTOR WAS THE FIRST
•3450 DATA OF HIS BREED
•3460 DATA WHO IS HE ?,0
•3470 DATA POUSY LASES,SOUPY SALES
•3480 DATA HIS STRAIGHT MAN
•3490 DATA WAS FANG..LOVED TO
•3500 DATA RECEIVE PIES
•3510 DATA WHO IS HE ?,0
•3520 DATA KIMECY SMUEO,MICKEY MOU
SE
•3530 DATA WALT'S FAVORITE
•3540 DATA CHARACTER ALTHOUGH
•3550 DATA HE WASN'T GOOFY
•3560 DATA WHO IS HE ?,0
•3570 DATA NOBIR LIAMSWIL,ROBIN WI
LLIAMS
•3580 DATA HE WAS OUT OF THIS
•3590 DATA WORLD BUT MINDY
•3600 DATA LOVED HIM..WHO IS
•3610 DATA THIS ACTOR ?,0
•3620 DATA RAWHOD CLESOL,HOWARD CO
SELL
•3630 DATA A WIG AND MOUTH ARE
•3640 DATA HIS TRADEMARKS...
•3650 DATA VERY SARCASTIC
•3660 DATA WHO IS HE ?,0
•3670 DATA REPRY MOOC,PERRY COMO
•3680 DATA LOTS OF LETTERS
•3690 DATA WERE RECEIVED FOR
•3700 DATA THIS CROONER
•3710 DATA WHO IS HE ?,0
```

BUG REPELLENT LINE CODES FOR NAME THAT STAR

```
LINE # 1:NI
LINE # 2:NI
LINE # 3:BI
LINE # 4:DM
LINE # 60:EM
LINE # 70:II
LINE # 80:KI
LINE # 85:OI
LINE # 90:MA
LINE # 100:PA
LINE # 110:KA
LINE # 120:KA
LINE # 130:OM
LINE # 140:BA
LINE # 170:MA
LINE # 180:MI
LINE # 190:KI
LINE # 200:KA
LINE # 210:OA
LINE # 215:IA
LINE # 220:EI
LINE # 230:NI
LINE # 240:PA
LINE # 250:KA
LINE # 260:JI
LINE # 270:BA
LINE # 280:IA
LINE # 290:BA
LINE # 300:FA
LINE # 310:BA
LINE # 315:GM
LINE # 320:BA
LINE # 330:GI
LINE # 340:AA
LINE # 350:NI
LINE # 360:GI
LINE # 365:MA
LINE # 370:OI
LINE # 380:KA
LINE # 390:LE
LINE # 400:KA
LINE # 410:PE
LINE # 420:AA
LINE # 430:JI
LINE # 435:EA
LINE # 440:GE
LINE # 447:DM
LINE # 448:CE
LINE # 449:AM
LINE # 450:LI
LINE # 455:JI
LINE # 460:KA
LINE # 465:BE
LINE # 470:GM
LINE # 472:NI
LINE # 475:IA
LINE # 480:PA
LINE # 490:GA
LINE # 500:AA
LINE # 505:CI
LINE # 510:JM
LINE # 520:FM
LINE # 530:LI
LINE # 535:AA
LINE # 540:KI
LINE # 545:HI
LINE # 550:AA
LINE # 555:MI
LINE # 560:JM
LINE # 565:KE
LINE # 570:MI
LINE # 580:GE
LINE # 585:AM
LINE # 590:GA
LINE # 600:KI
LINE # 610:DI
LINE # 620:MA
LINE # 630:DA
LINE # 640:MI
LINE # 650:KI
LINE # 660:DI
LINE # 670:MA
LINE # 680:DA
LINE # 690:KI
LINE # 700:NI
LINE # 710:MA
LINE # 720:EI
LINE # 745:PI
LINE # 746:AM
LINE # 750:OA
LINE # 760:NI
LINE # 765:MA
LINE # 770:MA
LINE # 780:NA
LINE # 790:AA
LINE # 800:EA
LINE # 810:MI
LINE # 820:JI
LINE # 830:LE
LINE # 840:AA
LINE # 878:OE
LINE # 879:AM
LINE # 880:OA
LINE # 890:DI
LINE # 898:KE
LINE # 899:AM
LINE # 900:DA
LINE # 910:JI
LINE # 920:PI
LINE # 930:II
LINE # 940:EI
LINE # 960:CA
LINE # 970:NA
LINE # 980:DI
LINE # 998:IE
LINE # 999:AM
```

```
LINE # 1000:KA
LINE # 1010:DI
LINE # 1020:DI
LINE # 1030:DI
LINE # 1040:DI
LINE # 1060:OA
LINE # 1070:DI
LINE # 1460:BA
LINE # 1470:BA
LINE # 1498:PE
LINE # 1499:AM
LINE # 1500:LA
LINE # 1510:EM
LINE # 1520:IA
LINE # 1530:EA
LINE # 1540:KA
LINE # 1550:NM
LINE # 1560:DE
LINE # 1570:CA
LINE # 1580:BA
LINE # 1590:CE
LINE # 1600:FA
LINE # 1610:MI
LINE # 1620:BA
LINE # 1630:PM
LINE # 1640:FA
LINE # 1650:II
LINE # 1660:BA
LINE # 1670:NM
LINE # 1680:IE
LINE # 1690:NM
LINE # 1700:BA
LINE # 1704:DM
LINE # 1705:IE
LINE # 1706:AM
LINE # 1710:AA
LINE # 1720:GA
LINE # 1730:CI
LINE # 1740:ME
LINE # 1750:BA
LINE # 1760:OM
LINE # 1770:LM
LINE # 1780:AI
LINE # 1790:ME
LINE # 1800:JA
LINE # 1810:MM
LINE # 1820:NA
LINE # 1830:II
LINE # 1840:ME
LINE # 1850:BA
LINE # 1860:NM
LINE # 1870:DE
LINE # 1880:DI
LINE # 1890:BM
LINE # 1900:DA
LINE # 1910:PE
LINE # 1920:CE
LINE # 1930:FA
LINE # 1940:ME
LINE # 1950:BA
LINE # 1960:PE
LINE # 1970:HM
LINE # 1980:JE
LINE # 1990:PE
LINE # 2000:DA
LINE # 2010:GA
LINE # 2020:PM
LINE # 2030:BA
LINE # 2040:DA
LINE # 2050:DA
LINE # 2060:JA
LINE # 2070:JE
LINE # 2080:BE
LINE # 2090:KM
LINE # 2100:JA
LINE # 2110:IA
LINE # 2120:DA
LINE # 2130:NE
LINE # 2140:KM
LINE # 2150:DA
LINE # 2160:ME
LINE # 2170:JA
LINE # 2180:BE
LINE # 2190:ME
LINE # 2200:DA
LINE # 2210:EA
LINE # 2220:ME
LINE # 2230:LE
LINE # 2240:AA
LINE # 2250:JA
LINE # 2260:BA
LINE # 2270:MA
LINE # 2280:JI
LINE # 2290:II
LINE # 2300:OA
LINE # 2310:FA
LINE # 2320:IE
LINE # 2330:MM
LINE # 2340:IA
LINE # 2350:EA
LINE # 2360:GA
LINE # 2370:CA
LINE # 2380:DA
LINE # 2390:CI
LINE # 2400:DA
LINE # 2410:DA
LINE # 2420:CE
LINE # 2430:DA
LINE # 2440:KE
LINE # 2450:BA
LINE # 2460:AE
LINE # 2470:IE
LINE # 2480:OE
LINE # 2490:CE
LINE # 2500:KA
LINE # 2510:MM
LINE # 2520:DA
LINE # 2530:KA
LINE # 2540:BM
LINE # 2550:JA
LINE # 2560:JE
LINE # 2570:DA
LINE # 2580:OM
LINE # 2590:OM
LINE # 2600:DA
LINE # 2610:JA
LINE # 2620:LE
LINE # 2630:OE
LINE # 2640:IE
LINE # 2650:BA
LINE # 2660:NA
LINE # 2670:CE
LINE # 2680:IA
LINE # 2690:II
LINE # 2700:DA
LINE # 2710:LA
LINE # 2720:ME
LINE # 2730:OI
LINE # 2740:PA
LINE # 2760:DA
LINE # 2770:HE
LINE # 2780:HI
LINE # 2790:FE
LINE # 2800:ME
LINE # 2810:BA
LINE # 2820:LE
LINE # 2830:HA
LINE # 2840:PE
LINE # 2850:NM
LINE # 2860:LA
LINE # 2870:JI
LINE # 2880:MI
LINE # 2890:IM
LINE # 2900:AA
LINE # 2910:KA
LINE # 2920:CA
LINE # 2930:LA
LINE # 2940:PE
LINE # 2950:ME
LINE # 2960:CA
LINE # 2970:FM
LINE # 2980:AM
LINE # 2990:II
LINE # 3000:GE
LINE # 3010:OA
LINE # 3020:HM
LINE # 3030:LE
LINE # 3040:CM
LINE # 3050:CM
LINE # 3060:JA
LINE # 3070:LE
LINE # 3080:AM
LINE # 3090:PE
LINE # 3100:DA
LINE # 3110:KA
LINE # 3120:EM
LINE # 3130:DE
LINE # 3140:HE
LINE # 3150:JM
LINE # 3160:KA
LINE # 3170:DE
LINE # 3180:BE
LINE # 3190:NI
LINE # 3200:KM
LINE # 3210:BA
LINE # 3220:EE
LINE # 3230:KI
LINE # 3240:BI
LINE # 3250:BE
LINE # 3260:DA
LINE # 3270:PA
LINE # 3280:AM
LINE # 3290:HE
LINE # 3300:NE
LINE # 3310:BA
LINE # 3320:OA
LINE # 3330:LI
LINE # 3340:DM
LINE # 3350:CA
LINE # 3360:DA
LINE # 3370:NI
LINE # 3380:DE
LINE # 3390:LM
LINE # 3400:NA
LINE # 3410:OA
LINE # 3420:LI
LINE # 3430:IA
LINE # 3440:CI
LINE # 3450:MI
LINE # 3460:DA
LINE # 3470:JE
LINE # 3480:BA
```

```
LINE # 3490:LM     LINE # 3610:BA
LINE # 3500:EE     LINE # 3620:IA
LINE # 3510:DA     LINE # 3630:DE
LINE # 3520:JM     LINE # 3640:CI
LINE # 3530:EE     LINE # 3650:LE
LINE # 3540:II     LINE # 3660:DA
LINE # 3550:CE     LINE # 3670:DE
LINE # 3560:DA     LINE # 3680:CM
LINE # 3570:OE     LINE # 3690:OA
LINE # 3580:JE     LINE # 3700:PA
LINE # 3590:ME     LINE # 3710:DA
LINE # 3600:EE     LINES: 351
```

APPLE PIE

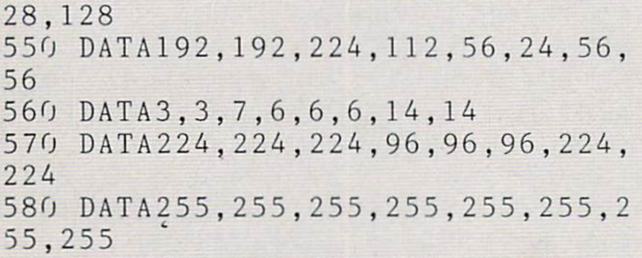
From page 38

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
•1 GOSUB200:TI$="000000":B=7176:L=
8140:CC=30720:D=-1:S1=36878:S2=S1
-2:AP=0
•2 FORI=7168TO7679:POKEI,PEEK(I+25
600):NEXT
•3 FORZ=1TO96:READA:POKEB,A:B=B+1:
NEXTZ
•4 DEFFNN(M)=INT(RND(0)*10)+M
•5 PRINT"{SC}":POKE36879,189:POKE3
6869,255
•6 PRINT"{CU}{GN}IIIIIIIIIIIIIII{
RD}K{GN}IIIII":PRINT"{CU}{GN}IIII
IIII{RD}K{GN}IIIII{RD}K{GN}IIIIIJ
"
•7 PRINT"{GN}IIIIIIIII{RD}K{GN}III
IIII{RD}K{GN}IJ":PRINT"{GN}IIIIII
II{RD}K{GN}III{RD}K{GN}IIIIJ"
•9 PRINT"{GN}IIIIIIIIIII{RD}K{GN}I
{RD}K{GN}IIJ"
•13 PRINT"{RD}I{GN}IIIIIIII{RD}K{G
N}III{RD}K{GN}J":PRINT"{RD}I{GN}I
I{RD}K{GN}I{RD}II{GN}III{RD}K{GN}
IIJ":PRINT"{RD}I{GN}III{RD}II{GN}
I{RD}K{GN}IIIJ"
•14 FORX=1TO14:PRINT"{RD}IIIL":NEX
TX
•15 PRINT"{RD}IIIL{CU}"
•40 POKE36878,67
•50 T=3:S=6:IFN=1THENT=7:S=8
•60 N=N+1:IFN=2THENN=0
•63 N1=FNN(M):N2=FNN(M):PRINT"{HM}
":PRINTTAB(4)"{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}
   "
•64 PRINT"{HM}":PRINTTAB(4)"{CD}{C
D}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD
}";N1;
•65 PRINT"X";N2;:INPUT"=";N3
•66 IFN3=N1*N2THENGOSUB900:GOTO70
•67 IFN3<>N1*N2THENPOKES1,15:POKES
1-1,220
•68 FORX=1TO150:NEXT:POKES1,0:POKE
S1-1,0
•70 POKEL,32:POKEL+1,32:POKEL+22,3
2:POKEL+23,32:POKEL+44,32:POKEL+4
5,32
•75 L=L+D:IFL=8124THEND=1
•77 IFL=8140THENPOKE36869,240:PRIN
T"{SC}{BL}{RV}GAME OVER{RO}-TIME:
";TI$:PRINT"{CD}APPLES FOR TEACHE
R:";AP:END
•80 POKEL,1:POKEL+1,4:POKEL+22,2:P
OKEL+23,5:POKEL+44,T:POKEL+45,S
•90 POKEL+CC,12:POKEL+1+CC,12:POKE
L+22+CC,10:POKEL+23+CC,10:POKEL+4
4+CC,0:POKEL+45+CC,0
•100 GOTO50
•200 PRINT"{SC}{BK}":POKE36879,42
•210 PRINT"{SC}  {RV})*{RO}  {RV}
  {RO} {RV}   {RO} {RV} {RO}   {R
V}  {RO}"
•215 PRINT" {RV})  *{RO} {RV} {RO}
 {RV} {RO} {RV} {RO} {RV} {RO} {R
V} {RO}  {RV} {RO}"
•220 PRINT" {RV} {RO}  {RV} {RO} {
RV}  {RO} {RV}   {RO} {RV} {RO}
  {RV}  {RO}"
•225 PRINT" {RV}     {RO} {RV} {RO}
  {RV} {RO}   {RV} {RO}   {RV} {
RO}"
•230 PRINT" {RV} {RO}  {RV} {RO} {
RV} {RO}  {RV} {RO}   {RV}   {RO
} {RV}  {RO}"
•235 PRINT"{CD}      {RV}   {RO} {
RV}  {RO} {RV}   {RO}"
•240 PRINT"       {RV} {RO} {RV} {R
O}  {RV} {RO}  {RV} {RO}"
•242 PRINT"       {RV}   {RO}  {RV}
 {RO}  {RV}  {RO}"
•245 PRINT"       {RV} {RO}    {RV}
```

```
{RO}  {RV} {RO}"
•247 PRINT"        {RV} {RO}   {RV}
  {RO} {RV}    {RO}"
•248 PRINT"{CD}{CD}{WH}  BY, ROBER
T ALONSO"
•250 PRINT"{CD}{CD}WHICH LEVEL?":P
RINT"{CD}{RV}H{RO}ARD"
•255 PRINT"{RV}I{RO}NTERMEDIATE":P
RINT"{RV}E{RO}ASY{CD}{CD}{CR}{RV}
CHOOSE LETTER{HM}"
•265 GETA$:IFA$=""THEN265
•270 IFA$="H"THENM=45:GOTO290
•275 IFA$="I"THENM=15:GOTO290
•280 IFA$="E"THENM=3:GOTO290
•285 GOTO265
•290 PRINT"{CD}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{RV} PLEASE WAIT {RO}{HM}":RETURN
•500 DATA0,85,85,21,32,35,33,34
•510 DATA32,35,34,42,10,2,2,2
•520 DATA3,3,7,12,60,48,240,224
•530 DATA0,85,85,84,8,200,136,136
•540 DATA200,200,136,160,160,128,1
28,128
•550 DATA192,192,224,112,56,24,56,
56
•560 DATA3,3,7,6,6,6,14,14
•570 DATA224,224,224,96,96,96,224,
224
•580 DATA255,255,255,255,255,255,2
55,255
•590 DATA255,255,255,254,252,252,2
40,192
•600 DATA8,16,126,255,255,255,126,
60
•610 DATA254,255,255,254,255,255,2
55,254
•900 FORX=175TO215:POKES2,X:FORX1=
15TO10STEP-1:POKES1,X1:NEXTX1,X
•905 POKES1,0:POKES2,0:POKE8185,11
:POKE8185+CC,2
•907 AP=AP+1
•910 PRINT"{HM}{RV}APPLES";AP:POKE
7686,9:POKE7686+CC,5:RETURN
```



LOWER CASE DESCENDERS

From page 54

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
•100 REM *** ROUTINE FOR PRINTING
LOWER CASE DESCENDERS ***
•110 REM *** USING THE COMMODORE 1
•515 OR 1525 PRINTERS  ***
•120 REM           *** BY MORTON K
EVELSON ***
•130 REM           ***   SEPTEMBER
 1983  ***
•140 PRINT CHR$(14):REM SET KEYBOA
RD TO UPPER/LOWER CASE MODE
•150 PRINT CHR$(8):REM DISABLE SHI
FT/COMMODORE KEY
•160 PRINTCHR$(147)CHR$(17)CHR$(17
)"              READING DATA "
•170 DIM LC$(5),DS$(5)
•180 DATA8,184,196,196,196,248,128
,15,17:REM ** UPPER HALF OF 'G' *
*
•190 DATA8,128,128,132,253,128,128
,15,17:REM ** UPPER HALF OF 'J' *
*
•200 DATA8,252,196,196,184,128,128
,15,17:REM ** UPPER HALF OF 'P' *
*
•210 DATA8,184,196,196,252,128,128
,15,17:REM ** UPPER HALF OF 'Q' *
*
•220 DATA8,188,192,192,252,128,128
,15,17:REM ** UPPER HALF OF 'Y' *
*
•230 DATA8,128,132,132,132,131,128
,15,17:REM ** DESCENDER FOR 'G' *
*
•240 DATA8,128,130,132,131,128,128
,15,17:REM ** DESCENDER FOR 'J' *
*
•250 DATA8,135,128,128,128,128,128
,15,17:REM ** DESCENDER FOR 'P' *
*
•260 DATA8,128,128,128,135,128,128
,15,17:REM ** DESCENDER FOR 'Q' *
```

```
*
•270 DATA8,132,132,132,131,128,128
,15,17:REM ** DESCENDER FOR 'Y' *
*
•280 FORI=1TO5:FORJ=1TO9
•300 READLC
•310 LC$(I)=LC$(I)+CHR$(LC)
•330 NEXTJ:NEXTI
•340 FORI=1TO5:FORJ=1TO9
•360 READDS
•370 DS$(I)=DS$(I)+CHR$(DS)
•390 NEXTJ:NEXTI
•400 P5$="":REM TEMPORARY STRING F
OR MAIN TEXT.
•410 SU$="":REM TEMPORARY STRING F
OR DESCENDER GRAPHICS.
•420 PRINT"TYPE A SENTENCE"
•430 INPUT A$
•440 L=LEN(A$):G=0
•450 FORI=1 TO L
•460 A5$=MID$(A$,I,1)
•470 IFA5$=CHR$(71)THENG=1:REM **
CHECK FOR LOWER CASE 'G' **
•480 IFA5$=CHR$(74)THENG=2:REM **
CHECK FOR LOWER CASE 'J' **
•490 IFA5$=CHR$(80)THENG=3:REM **
CHECK FOR LOWER CASE 'P' **
•500 IFA5$=CHR$(81)THENG=4:REM **
CHECK FOR LOWER CASE 'Q' **
•510 IFA5$=CHR$(89)THENG=5:REM **
CHECK FOR LOWER CASE 'Y' **
•520 IFG=0GOTO550
•530 P5$=P5$+LC$(G):REM USE CUSTOM
 GRAPHICS FOR G,J,P,Q,Y.
•540 SU$=SU$+DS$(G):GOTO560:REM CU
STOM GRAPHICS FOR DESCENDER LINE.
•550 P5$=P5$+A5$:SU$=SU$+" "
•560 G=0:NEXTI
•570 OPEN4,4
•580 PRINT#4,CHR$(17)P5$CHR$(8)
•590 PRINT#4,CHR$(15)CHR$(17)SU$CH
R$(8)
•600 PRINT#4,CHR$(15):CLOSE4
•610 PRINT"AGAIN ?"
•620 GET G$:IF G$="" GOTO 620
•630 IF G$="Y"GOTO400
•640 PRINT CHR$(9)CHR$(142):REM RE
STORE UPPER CASE MODE. ENABLE SHI
FT COMM. KEY
•650 END
```



BUG REPELLENT LINE CODES FOR LOWER CASE DESCENDERS

LINE # 100:PI	LINE # 400:HI
LINE # 110:PI	LINE # 410:KA
LINE # 120:JI	LINE # 420:OA
LINE # 130:HI	LINE # 430:OI
LINE # 140:IE	LINE # 440:EA
LINE # 150:NM	LINE # 450:GA
LINE # 160:HA	LINE # 460:AM
LINE # 170:AM	LINE # 470:II
LINE # 180:AI	LINE # 480:OI
LINE # 190:GI	LINE # 490:KI
LINE # 200:CI	LINE # 500:MI
LINE # 210:EI	LINE # 510:MI
LINE # 220:EI	LINE # 520:NI
LINE # 230:AI	LINE # 530:GA
LINE # 240:GI	LINE # 540:OA
LINE # 250:CI	LINE # 550:HI
LINE # 260:EI	LINE # 560:NE
LINE # 270:EI	LINE # 570:FA
LINE # 280:FE	LINE # 580:EE
LINE # 300:NM	LINE # 590:EE
LINE # 310:DM	LINE # 600:FA
LINE # 330:JE	LINE # 610:EA
LINE # 340:FE	LINE # 620:FA
LINE # 360:NM	LINE # 630:KA
LINE # 370:DM	LINE # 640:LM
LINE # 390:JE	LINES: 52

READER SERVICE INDEX

Pg #	Company	Reader Service #
14	Adventure International	120
12	Alien Group	114
2	Cardco Inc.	115
8	Commodore Business Machines, Inc.	107
52	Computer Alliance	129
75	Computer Creations	105
40	Computer Discount Sales	106
14	Creative Equipment	121
18	Datamost/Overbyte	125
99	Datasoft Inc.	133
34	Eastern House	123
7	Hayden Book Company	134
8	Human Engineered Software	108
51	Kiwi Software	135
10	Micro Software International	112
18	Microtechnic Solutions	124
52	Microware	130
100	Mirage Concepts	128
73	OEM	132
26-31	Protecto Enterprizes	117,118,119, 124,126,127
10	Scholastic Wizware	111
9	Softwave	109
52	TOTL Software	131
70	York 10	122

Access. Retrieval of information from computer memory.

Access time. Time needed to retrieve information from computer memory.

Address. Location (identified by a number) of a byte of information in the computer's memory.

Alphanumeric. Alphabetic and numeric characters.

Analog signal. A continuous electronic signal of any frequency or strength that represents a condition (i.e.: the position of the game control paddles).

Applications software. Programs that will instruct the computer to perform either a specific task or a series of related tasks, usually relating to business or home uses.

ASCII. The American Standard Code for Information Interchange. This code allows two computers, which may entertain different languages, to communicate.

Assembler. A program that converts information in the computer's memory into a binary code for proper execution.

Assembly language. Machine language that has been translated into mnemonic codes, thus making it easier for the programmers to remember. A three letter code would be the equivalent to a string of eight digits.

BASIC. Beginner's All-purpose Symbolic Instruction Code. Easy to use, popular programming language that is widely used with microcomputers.

Baud. A unit (bits per second) that measures the rate of speed at which data is translated from one device to another. (Heck, every baud *we've* ever known has been fast.)

Binary code. A system of numbers that uses two digits, 0 and 1, to express all characters (both numbers and letters). The computer then uses this string of numbers to process information.

Bit. An acronym for *B*inary Dig*IT*. Represents either "0" or "1" in the binary code. Approximately eight bits (one byte) are required to represent one character.

Bidirectional printing. Special feature on some computer printers that allows the printer to print first right to left and then drop to the next line and print left to right. This feature speeds up the printing process.

Board. A thin, rectangular, flat electronic component that contains one or more layers of printed circuits. Chips and other electronic parts are often attached to a circuit board.

Boot. To start or restart a computer by transferring instructions ("Heel!"?) from a storage device, such as a tape or disk, into the computer's memory.

Bug. A logic error in a computer program that causes the program to dysfunction.

Bus. A conductor that allows data to be passed between the various computer components. Buses are manufactured that will allow different brands of components to be used with the same computer. (They can often be seen entering terminals.)

Byte. Plural of bit. There are eight bits in one byte. Each byte represents one character.

CAI. Computer Assisted Instruction. This refers to a variety of instructional and/or educational software.

Card. A circuit board which is attached to a standing computer, often to boost its memory capability.

Cartridge. Sometimes referred to as a ROM module or solid state cartridge. Device that contains a prerecorded program (such as a game).

Cassette Tape Recorder. Device used either to store data or to house prerecorded programs. Often, but not always, the same type used in audio recording. If so, a special interface may still be required. A much slower and less reliable medium than disk drive.

C-BASIC. Very popular non-interactive language that is utilized by 8080, 8085 and Z80 microprocessor computers. C-BASIC executes data at a more accelerated rate than the standard interpreter BASIC.

Character. A single symbol, letter, or number.

Character set. Total catalogue of alphanumeric, special, and punctuation characters accessible to a printer or terminal.

Chip. An integrated circuit, a quarter to three quarters of an inch square, that is etched on a tiny piece of silicon. Chips are the building blocks of computers and are able to contain anywhere from a few dozen to several thousand transistors or circuit elements. They perform many functions: calculations, memory operation and storage or controlling other chips. Up to 32,000 bytes of information may be stored in a single chip.

CPU. Central Processing Unit, or microprocessor. The electronic "core" of a computer. All information is passed through the CPU and all functions are executed from the CPU.

Circuit Board. see board.

COBOL. Acronym for Common Business Oriented Language. High level language for business applications.

Command. An instruction (e.g.: run, load) that tells the computer to do something.

Compatibility. The ability of the computer and any or all of its peripherals to be able to function in conjunction with one another.

Compiler. A program that translates any high level language into the binary code that is required for the computer.

Computer. A programmable electronic device, consisting of a CPU, memory and input/output (I/O) capability, that stores, retrieves, and processes data.

Computer system. A computer setup that consists of a computer terminal and its software and various peripherals.

CP/M. Control program for microcomputers. A single-user operating system for microcomputers that is in very wide use, especially for business applications.

CRT. Cathode Ray Tube. The most popular type of display screen. Often it is simply the screen of an ordinary television set though it can be a monitor specially designed for use with computers.

Cursor. Symbol, most often a small flashing square, that indicates where the next character will appear.

Data. All information that is processed by the computer.

Datum. Singular of data.

Data Bank. The central storage locations for all of the information that the computer has access to.

Data base manager. Program that enables user to enter files, organize matter and sort and retrieve information.

Daisy wheel printer. A letter quality impact printer that utilizes a daisy wheel, a circular printing element containing as many as a hundred characters.

Descenders. The lower case characters g,j,p,q, and y, which have tails that extend past the baseline formed by the other characters.

Disk. A flat, round device for storing computer data. Like a phonograph disc, it rotates and contains information in tracks. Unlike a phonograph disc, it is never removed from its protective jacket. A disk can be made of hard plastic (hard disk) or soft plastic (floppy disk, diskette).

Diskette. See disk.

Disk drive. A machine that rotates a disk for the purpose of entering new information or copying existent information from the disk into the com-

puter's memory.

Display. Generally a television-style screen, it shows the user the information contained in the terminal memory.

Documentation. Written instructions for operating hardware or software.

DOS. Disk Operating System. (See Operating System.)

Dot matrix. The method by which most printers form alphanumeric characters or graphics, by printing a series of dots.

Double-density. Refers to the process of doubling the amount of information that can be placed on a disk or cassette.

Downtime. When a computer is "down," or unoperational.

Dual Intensity. Refers to a printer that can produce bold type in additional to ordinary type.

Editor. A program which makes it possible to enter text into a computer.

Electronic mail. Telephone transmission (via a modem) of information between computer users.

EPROM. Erasable Programmable Read Only Memory. A device such as a cartridge or disk that can have data added to it or erased.

Floppy disk. See disk.

FORTRAN. Formula Translator. Advanced programming language used for complex mathematical operations.

Emulator. A program-translating device that enables software designed for a particular computer to run on a different one.

Firmware. ROM-contained data, built into the machine or added via software, that cannot be changed.

Flow chart. Diagram outlining procedure for writing a program.

Format. (or Initialize) To get a disk ready to accept information.

Function key. A key on a computer that can be assigned to perform a particular function.

Full duplex. Communication mode capable of simultaneous transmission and reception of data.

Graphics. Non-textual CRT displays: charts, symbols, etc.

Graphics tablet. A device which will transfer whatever is drawn on it onto the computer monitor.

Half duplex. Communication mode capable of transmission of data and reception of data, but not at the same time.

Hard copy. Information, when it has been transferred from memory to a computer printout, is hard copy.

Hardware. Mechanical, non-software components of a computer system: computer, disk drive, printer, etc.; also, the components of the components, such as transistors, circuits, etc. Also the components of the components of the . . .just kidding.

Hard disk. Nonremovable storage device that is faster and has a far greater storage capacity than a floppy disk. It is generally hermetically sealed within the unit.

Hexadecimal. A base-16 numeration method widely used with computers. Numbers run from 0 to 9, then from A to F. Hexadecimal (or "hex") numbers are identified with the suffix H.

High-level language. An easily learned programming language that resembles human languages such as English. Examples. BASIC. COBOL, FORTRAN. Low level languages (such as Assembly) require that every command and function be separately programmed.

High resolution. High-quality graphics capability when applied to a video terminal. An individual software program may itself contain high-resolution graphics, meaning detailed or colorful graphics. A subjective term and therefore frequently abused (especially on New Years Eve).

Impact printer. A typewriter-style printer that presses characters through a ribbon.

Index hole. A hole punched in a floppy disk that is used by the disk drive to locate the beginning of sector 0 on the disk.

Instruction. A command contained in a program.

Interface. A connecting device which can be electronic or can be contained in software, for making a computer compatible with a peripheral device.

I/O. Input/Output. The system of pathways which channel information into a computer (usually through a keyboard, joystick, mouse, light pen) and out of the computer (usually onto a screen or printer).

K. See "Kilobyte"

Kilobyte. See "K". Seriously, a kilobyte (or 1K) is equal to 1,024 bytes (often rounded off to 1,000 bytes), and is the measure of the memory hardware or software can contain (8K, 64K, etc., etc.). Obviously, the higher the number the more capable the hardware/software.

Letter-quality. Refers to a printer that uses formed characters, such as those contained on a daisy wheel. Compare dot matrix printer.

Library. Collection of computer programs.

Light Pen. A device that allows a user to draw line figures or make menu selections directly on the screen. Proper hardware port and software required.

Load. Entry of information into the computer from an external storage, such as cassette player or disk drive.

LOGO. Programming language useful for graphics. Primarily employed in young children's education, each command is built logically on the previous command.

Loop. Programming statement used to order repetition of a task. A particularly useful one is called a "fruitful loop."

Machine language. Language used by the computer, comprised of binary numbers, into which the computer must translate programming languages.

Megabyte. Equal to 1,048,576 bytes (1048 kilobytes). Often abbreviated Mb.

Megahertz. Electrical frequency measure equalling one million cycles per second. Often abbreviated MHz.

Membrane. A flat computer keyboard that has touch-sensitive areas for each character rather than full-travel or stepped keys.

Memory. The word used to indicate any given computer's capacity to store information (10K memory etc.). There are different kinds of memory (ROM, RAM) and, within any computer, different memory locations (for sound, screen displays etc.).

Menu. A screen display of programs, on a particular disk or options in a program.

Microcomputer. An integrated small computer. It contains a microprocessor, memory, and interfaces for inputting and outputting information. Perfect example? Commodore 64.

Microprocessor. The brains of the computer, where mathematics and logical functions are performed. Also called the CPU.

Modem. Modulator/Demodulator. A device that changes information in analog form into digital form, and vice versa, for the purpose of transmitting computer information across a telephone line.

Monitor. Screen for displaying computer information.

Mouse. An input device, usually containing a selection button. The user slides the mouse on the

desktop beside the computer, and the cursor will duplicate the mouse's movement on the screen. Used to make menu selections and re-arrange information.

MP/M. Multiprogramming control Program for Microprocessors. A variety of the CP/M operating system that can be used by several users at a time.

Multi-user system. A system with a central pool of data or applications that can be accessed simultaneously be several users.

Number crunching. Refers to a computer's carrying out intricate or dense arithmetic or numerical functions.

Nybble. Half a byte, or four bits. (Or two shaves and two haircuts.)

Object code. A code in binary form, produced by an assembler or compiler program, A source code, by contrast, must be translated by an assembler or compiler before it can be executed by the CPU.

Octal. A base-8 numeration method often used with microcomputers. Numbers run from 0 to 7, and are identified with the suffix Q.

On-line. The state of being hooked up to an active computer, as in the case of a printer or disk drive that is connected and operational.

Operating system. The program(s) that supplies the computer system with its operating information, including start-up instructions at the time the system is turned on and supervisory instructions each time a new program is loaded.

Output. The path system that channels information out of a computer (usually to a screen or printer).

Overstriking. A method of producing boldface type by directing the printer to hit a character more than once.

Parallel. An input/output system that submits 8 bits of data at a time. An interface would have to be installed between a computer's serial port and a parallel printer, for example.

PASCAL. A more sophisticated programming language than BASIC, using less memory and producing faster programs. Named after Blaise Pascal.

PEEK. A programming command generally meaning: examine (specified location) and report the value that is represented there.

Peripheral. A hardware accessory to a computer, such as a printer or a modem.

Pixel. Picture element. A dot of light on a TV or computer screen, the smallest light fragment that the computer can address. Graphics with high resolution are generally composed of very small, and therefore numerous pixels.

Plotter. Machine for printing lines or graphs.

POKE. A programming command that is used to place a new value into a specified memory location.

Printer. Machine used to print computer information onto paper. See dot matrix, letter quality, daisy wheel.

Program. As a noun: a set of instructions given to a computer to enable it to perform a particular function. As a verb: to input such information into a computer.

Programming language. A language used in the composition of a computer program.

PROM. Programmable Read Only Memory. A permanent storage system for data that can be programmed both by the manufacturer and by the user.

Quad-density. Refers to a two-sided, double-density disk which is able to store four times the information of a one-sided, normal density disk.

RAM. Random Access Memory. Volatile storage system for data that can be changed—added to, subtracted from, rearranged—by the user. Information stored in RAM must be saved before the system is shut off or it will be lost.

Read/write. Signifies that information can be both read from and written into memory (RAM or permanent storage).

Resolution. A measure of the sharpness of a CRT (cathode ray tube) picture. Expressed in pixels, it can refer to either the number of scanning lines on the terminal or the number of addressable pixels on the screen.

Reverse video. The displaying of dark characters on a light background.

RF Modulator. Used to change computer video signals into radio frequency signals that can be picked up by a TV antenna and displayed.

RGB. Video signal composed of red, green, and blue that has much higher resolution and brighter colors than the standard composite color TV signals. A monitor with three separate electron guns, rather than the single gun used by the average color TV, is required.

ROM. Read Only Memory. Data that is built into a computer or software, and cannot be changed, such as the information that operates the computer immediately after start-up. In a computergame, for example, backgrounds which do not change or are not affected by gameplay are ROM. Spaceships and projectiles, which constantly are updated, are RAM.

Save. Recording information from the computer's memory onto tape or a disk.

Scrolling. Moving up and down (or from left to right) through the displayed information contained in the computer's memory, only a certain portion of which can be displayed on the terminal screen at one time.

Sector. A part of the track of a storage disk.

Serial. An input or output system that submits one bit of data at a time.

Serial port. A computer's input or output port through which data is transmitted in serial fashion. This is generally done, with home computers, through an RS232C serial interface port.

Single-sided. A disk with only one side that can store data.

Software. Programs to run on a computer on tape, disk, or cartridge. Everything from *Donkey Kong* to *Data Base*.

Source code. Program written in English-like words via an editor program which needs to be translated (with an assembler or compiler) into a language the computer understands.

Sprite. A high resolution programmable object. Any graphic figure is a sprite; sprites can be changed and animated through commands in BASIC

Syntax. Rules of grammatical usage governing programming language, as with English and other languages.

Terminal. The screen that displays computer information.

Text. The words and numbers displayed on the CRT screen.

Tractor feed. Mechanism that holds fan-fold paper in place and moves it through the printer, using sprockets that fit into the holes on both sides of the paper.

Volatile storage. A storage device, such as RAM, that loses the data it contains when power is cut off.

Winchester. A variety of hard disk that is sealed in a container.

Word processor. Can refer to the complete system, usually consisting of computer, display, memory storage, and printer, that is used to produce written documents; also refers to a software program that enables a computer to perform word processing functions.

Write. The process of transferring data from memory to permanent storage.

Write protection. Process that prevents writing to, or erasing from, a disk. With 8-inch disks, this is accomplished by removing a tab from the jacket; With 5¼ disks, by affixing the tab to the jacket.

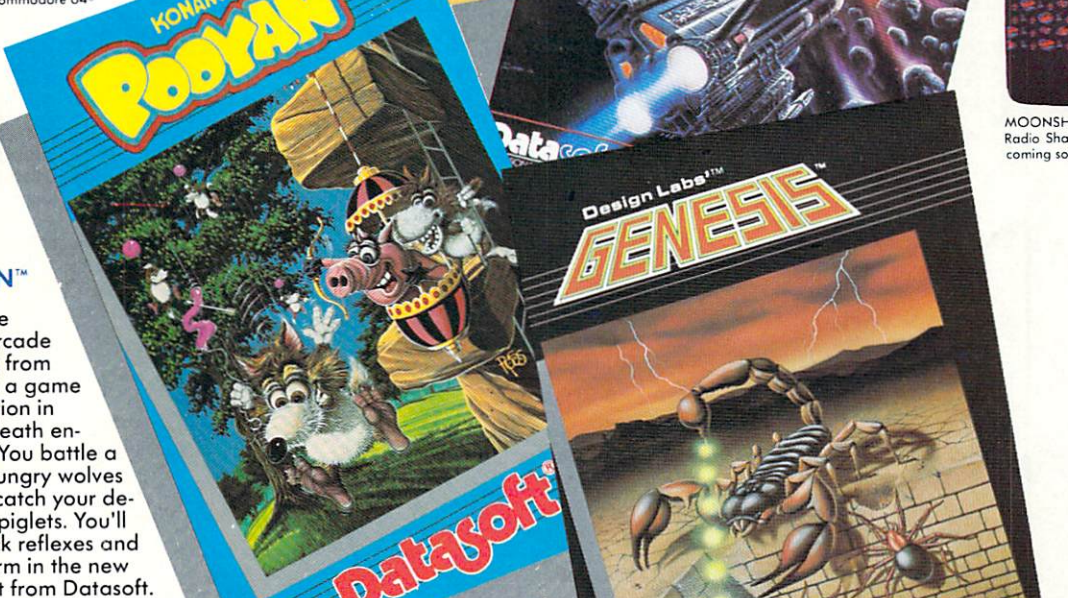
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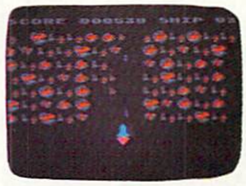


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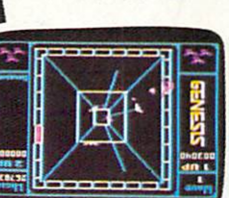
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